BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
WESTERN ZONE BENCH, PUNE

EXECUTION APPLICATION NO. 07/2022
IN
ORIGINAL APPLICATION NO. 190/2016

In the matter of:

MAJ. GEN. S.C.N. JATAR (RETD.) — APPLICANT

VERSUS

THE MUNICIPAL CORPORATION OF THE CITY OF PUNE & ORS. — RESPONDENT

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Date: 16/04/2023
Place: Pune

(Bharat K Sharma)
Regional Director

भरत कुमार शर्मा/Bharat Kumar Sharma
क्षेत्रीय निदेशक / Regional Director
केन्द्रीय प्रदूषण नियंत्रण बोर्ड
Central Pollution Control Board
क्षेत्रीय निदेशालय, पुणे/Regional Directorate, Pune
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार
M/o Envt. Forest & Climate Change, Govt. of India
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REPORT OF THE EXPERT GROUP IN COMPLIANCE TO THE HON'BLE NGT ORDER DATED 10.01.2023 & 27.02.2023 IN EXECUTION APPLICATION NO. 07/2022 (IN ORIGINAL APPLICATION NO. 190/2016), MAJ. GEN. S.C.N. JATAR (RETD.) VS THE MUNICIPAL CORPORATION OF THE CITY OF PUNE & ORS.

1.0 Background

In the matter of OA No. 190/2016 (WZ) titled Maj. Gen. S.C.N. Jatar (Retd.) vs The Municipal Corporation of the city of Pune &Ors., Hon'ble NGT issued the following directions n the matter of OA No. 190/2016 (WZ) titled Maj. Gen. S.C.N. Jatar (Retd.) vs The Municipal Corporation of the city of Pune &Ors., Hon'ble NGT issued the following directions vide order dated 03.02.2022

"*We also direct CPCB to have interaction with State PCBs/ PCCs on the subject of waste composting processes in the interest of rule of law and protection of environment and public health, including MSW Rules, 2016".*

In the Execution Application No. 07 of 2022 in the said matter the following direction was issued to CPCB vide order dated 10.01.2023

In pursuance of our earlier order dated 21.11.2022, reply affidavit/compliance has not been filed from the side of respondent No. 6/CPCB. Ms. Divya Sinha, Head of the Solid Waste Management Division, CPCB has appeared and states that the process is going on as several reports have to be collected and then only, a report with respect to the new technology for composting would be prepared and submitted before us and for this, we allow her 15 days' time for filing the same.

In the Execution Application No. 07 of 2022 in the said matter the following direction was issued to CPCB vide order dated 27.02.2023

The learned Counsel for the Respondent No. 6/CPCB has prayed that the expert group, which was supposed to submit the report, is still in the process of completing the same, therefore, he seeks three weeks' time for submission of the same. By way of last opportunity, we grant the said time.

In compliance of Hon'ble NGT's Direction dated January 10, 2023, CPCB had submitted the Report with Hon'ble NGT in which it was informed that an Expert Group was constituted with members from CPCB-Delhi, CPCB Regional directorate Pune, Maharashtra Pollution Control Board, Pune Municipal Corporation and NEERI. The expert members group visited the site established for the purpose of study at Pune on 20.02.2023 & 21.02.2023 and the complete status report is being submitted on receipt of the respective analysis reports of the various samples. The detailed Report on technology adopted by M/s Ecoman Enviro Solutions is presented in the following sections.

2.0 Report on Composting Technology adopted by Ecoman Enviro Solutions

2.1. Introduction

The Expert Group comprising of the following nominated officials from aforementioned organizations, carried out the assessment of the technology of the composting using the said technology at Gold cliff, AnandInfracon, 5/N-5/7, 5/8, Parande Nagar Dighii, Pune, Maharashtra - 411015 on 20.02.2023 & 21.02.2023.

Table 1: Expert Group Members

S. No.	Name and Designation of the Expert Group Member	Organization
1.	Dr. Sandip Bodkhe, Sr. Principal Scientist, Solid and Hazardous waste management Division	CSIR-National Environmental Engineering Research Institute, Nehru Marg, Nagpur – 440020
2.	Smt. Sanjana Jadhav, Field Officer, MPCB	Maharashtra Pollution Control Board, Kalpataru Point, 3rd and 4th floor, Opp. PVR Cinema, Sion Circle, Mumbai – 400022
3.	Sh. Nitin Shinde, Deputy Engineer, PMC	Pune Municipal Corporation Main Building, Near. Mangla Theatre, Shivajinagar, Pune-411 005
4.	Sh. Pratik Bharne, Scientist - E, CPCB RD Pune	Central Pollution Control Board, Regional Directorate, S. No. 110, Dhankude Multi-Purpose Hall, Baner Road, Baner, Pune 411045
5.	Sh. Mayank Raj Purbey, Scientist-B, CPCB Delhi	UPC-II Div., Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi – 110032

The pilot plant set up by proponent is located at 18°37'14.40"N Latitude and 73°52'33.61"E Longitude. The site lies within the aerial distance of ~5.5Km from The Pune International Airport.

Source: *Google Earth Image of the pilot plant location*

The study has been conducted on the basis of study protocol as prepared by CPCB. The study protocol is enclosed at **Annexure I**.

2.2. Production Process

Composting is a biological process in which microorganisms (bacteria) convert organic waste into compost. Conventional way of composting takes 4-6 months for complete decomposition of the agricultural residues. The Ecoman's Composting System adopts the composting process in which thermophilic bacteria is used to convert organic waste into compost.

The composting process adopted by M/s. Ecoman Enviro Solutions is illustrated in **Figure 1**.

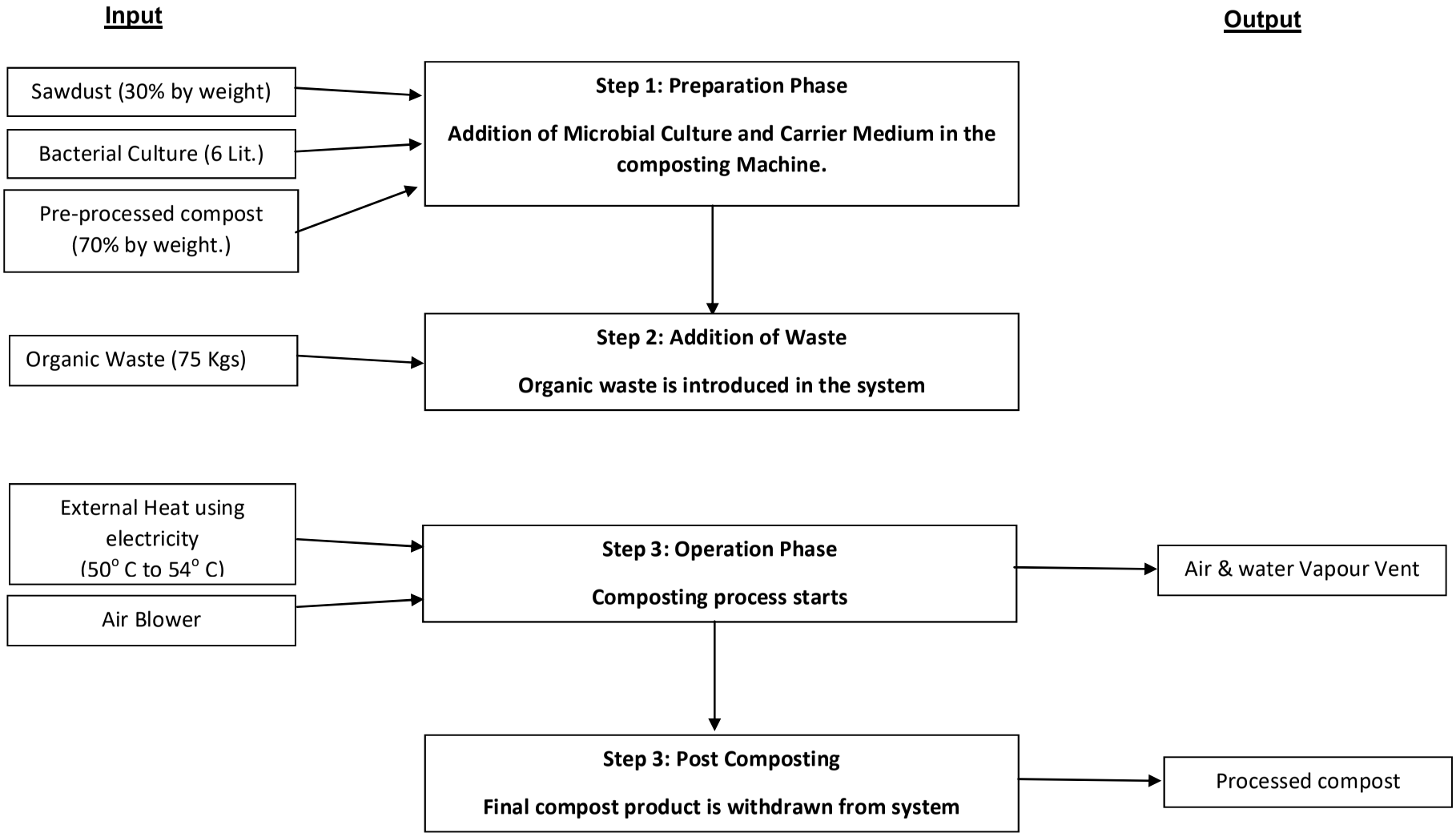

Figure 1: Step by Step Composting Process of M/s. Ecoman's Composting Machine

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2.2.1. Preparation Phase

- First the machine was filled with 50 kg mixture of sawdust (30% by weight) + thermophilic microbial culture (6 lit) + pre-processed compost (70% by weight**). (Figure 2)**
- It was informed that as ramping up the machine after initial commissioning takes 3-4 weeks and this case testing was being done immediately post installation, pre-processed compost has been added to achieve the initial ramping of machine.
- Sawdust acts as carbon for the composting process.
- Sawdust and bio culture is provided with the machine only once at the time of commissioning. There is no need to replace/add the sawdust and bio-culture into the machine.

Figure 2: Sawdust + microbial culture + pre-processed compost

2.2.2. Addition of Waste

- Input Waste was mainly kitchen Waste, food Waste, waste vegetables and fruits. The input organic waste was not entirely segregated as some portions of plastic material were seen in the sample waste.
- A total of 75 kg of Waste was added to the machine after weighing**. (Figure 3 -A, B& C)**

Figure 3: Input waste sample in the Ecoman's composting system (75kgs/day)

Figure 3 (A): Weighing of input waste

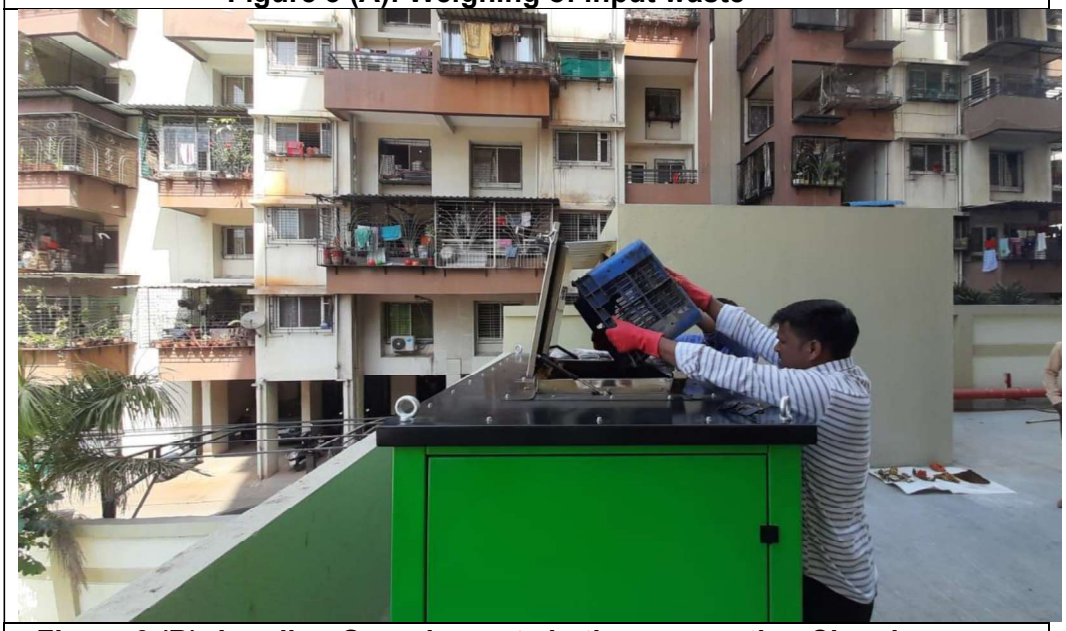


Figure 3 (B): Loading Organic waste in the composting Chamber

Figure 3 (C): Top view of waste inside he composting chamber

2.2.3. Operation Phase

- The Machine was turned on.
- The operation phase is controlled by two parameters, i.e. moisture and temperature.
- The moisture in the input waste is sensed by humidity sensor and the temperature started rising steadily.
- The machine Switched to Power Mode in which the air blower, motor paddles and heater works simultaneously in cycles based on software program in PLC (programmable logic controller).
- Power mode is on for about 10-15 hours, in which heaters are intermittently ON based on software program in PLC. (heater cycle – the heater turns OFF at 54^{o} C and again turns ON at 50^{o} C)
- When the moisture falls below 18% the machine goes to power saving mode in which heater turns off completely and motor and blower work on software program in PLC.
- Details of operating cycles as observed are as given below:
  - ✓ The normal operating time of the machine is about 10-15 hours and during this time the heaters, motor and blower are intermittently on and the software controls it.
  - ✓ The operating cycle of the motor is 45 seconds forward and pause for 10 seconds, then 45 seconds reverse and pause for 10 seconds and so on.
  - ✓ The operating cycle for the heater is 12 minutes on and 1 minute off and the set point of the compost inside the tank is 52^{o} Celsius with a hysteresis of 2^{o} Celsius.
  - ✓ That means the heater turns off at 54^{o} Celsius and again turns on at 50 ^{o} Celsius.
  - ✓ The heater takes about two hours to reach 54o Celsius from ambient temperature and takes about one hour plus to cool down 50^{o} Celsius and again takes about 20 minutes to reach

54° Celsius. This cycle continues during the operating cycle. The blower is continuously on for 24 hours and is the least or negligible consuming part.

2.2.4. Post Composting

- The machine operated at 53°C.
- The power supply of the machine was cut off and the front door was unlocked to initiate retrieval of compost from the system.
- Compost in the machine was found to be dark brown to black colour **(Figure 4)**

Figure 4:Compost Sample Collection from different sections of machine

2.3. About Ecoman's composting Machine

The ECOMAN machine (Figure5 A) comprises of a composting tank attached with an air blower, humidity sensor, ceramic plate which raises the temperature in the system with electricity, mixing blades connected to a shaft which rotates the paddles with 2 rpm, and an exhaust system. The machine has 2 openings which are door locked. The opening at the top is used for loading of organic waste. The second opening point is in the front–middle section of the machine which is the retrieval point for processed compost. The machine is automatically stopped when either of these doors (top & bottom) are opened.

Figure 5 (A): Front section of composting machine

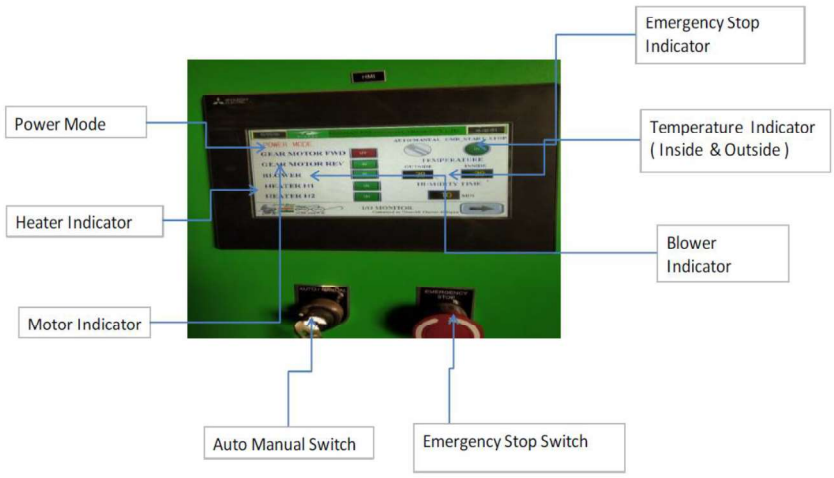


Figure 5 (B): Display Panel attached to composting machine

The machine has two levels of markings for removal of processed compost. The compost is to be removed when the compost level reaches the Green marking (first level marking) inside the composting tank. The second level, Red marking, is an indicator of overloading of the machine. Compost is then removed only up to shaft's top surface. As the compost output door is situated at the middle level, only half of the compost gets out of the machine and half

of the tank is always filled with the compost having the microorganisms to process further waste. This is done to maintain effective processing in the next cycle therefore additional bio-culture or sawdust is not required again in the machine.

According to SOP (**Annexure II**), it takes about 3-4 weeks for ramping up the machine after initial commissioning. During this time, only organic waste is added at the rate specified in the SOP and no compost is retrieved from the system. After completion of the first 4 weeks, it is advised to input waste as per capacity of machine at the rate of once per day. The retrieval of compost is advised after 3-4 days or when the compost level reaches a red line. Hence, after the first 4 weeks are over and the new organic waste is introduced into the system, the first batches have already achieved considerable compost quality. Therefore, the next day i.e. after 24 hrs the compost that is produced from the machine not necessarily shall be the compost of the same waste. But still the compost can be obtained from the older waste.

The operating procedures for Ecoman's composting machine has been laid out in the Standard Operating Procedure (SOP) which is attached here as **Annexure II**.

The technological details for different models of Ecoman's composting machine based on capacity has been provided in the below table.

Table 2: Technological details								
S. No.	**Study Parameter**	**Capacity Range of units (ex: F-25 denotes composting machine with 25 Kg waste processing capacity)**						
		F-25	**F-75**	**F-125**	**F-250**	**F-500**	**F-700**	**F-1250**
1	**Volume of Chamber (Ltrs)**	200	600	930	1700	3800	5700	9300
2	**No. of paddles in unit and RPM**	4/ 2 RPM	5/ 2 RPM	5/ 2 RPM	6/ 2RPM	6/ 2 RPM	6/ 2 RPM	6/ 2 RPM
3	**Qty. of Sawdust in the Chamber (in KG)**	12	35	60	150	350	560	840
4	**Qty& specification of microbial culture being used (in Ltr)**	4	6	9	12	18	24	30
5	**Processing capacity range of the unit (Per Day in KG)**	25	75	125	250	500	700	1250
6	**Waste feed rate (kg/day)**	25	75	125	250	500	700	1250
7	**Air flow arrangement /Blower flow rate**	Wall Mounted / 45W / 1 Phase	Wall Mounted / 90W / 1 Phase	Wall Mounted / 120W / 1 Phase	Foot Mounted / 370W / 3 Phase	Foot Mounted / 370W / 3 Phase	Foot Mounted / 750W / 3 Phase	Foot Mounted / 1500W / 3 Phase
8	**No. of Feeds per day**	Once	Once	Once	Once	Once	Once	Once
9	**Residence time of waste in the composting chamber**	24 to 96 hrs	24 to 96 hrs	24 to 96 hrs	24 to 96 hrs	24 to 96 hrs	24 to 96 hrs	24 to 96 hrs

10	**Maximum Moisture Content that can be acceptable in input waste**	70%	70%	70%	70%	70%	70%	70%
11	**Optimal temperature of compost process**	50^{O}-52^{O}C	50^{O}-52^{O}C	50^{O}-52^{O}C	50^{O}-52^{O}C	50^{O}-52^{O}C	50^{O}-52^{O}C	50^{O}-52^{O}C
12	**Power Rating**	1.5 KW	3.5 KW	5.5 KW	11 KW	16.3 KW	27.5 KW	41 KW
13	**Electrical consumption per day (Units)**	12	20	50	80	100	150	200
14	**cost per unit per day @Rs. 7**	Rs. 84	Rs. 140	Rs. 340	Rs. 560	Rs. 700	Rs. 1050	Rs. 1400
15	**Green/Red Line position**	Different for every model based on the height of the blades.						

2.4. Sampling &Analytical Results

2.4.1. Sampling Location

Samples were collected by NABL accredited laboratories for following stages:

a. Input organic waste
b. Carrier medium, i.e. sawdust + microbial culture + pre -processed compost mixture.
c. Compost product after 24 hrs processing from middle section of machine (75 Kg machine).
d. Compost product after 24 hrs processing from Lower section of machine (75 Kg machine).
e. Compost product from already established/running machine with capacity 500 Kgs running at a different location.
f. Monitoring for Ambient Air quality around the Ecoman composting machine has been conducted for 24 hrs time period.

2.4.2 Analysis Results

Analysis results for sampling locations a to e are given in Table 4 and that for location "f" are given in Table 3. Complete analysis reports have been provided in **Annexure III, & IV** with this report.

Table 3: Ambient Air Quality results

S.No.	Parameter	Near Garden	Building Back Side	Standards as per NAAQS	Unit
1.	Sulphur Dioxide (SO_2)	7.80	BLQ (LOQ: 4)	80	$\mu g/m^3$
2.	Nitrogen Dioxide (NO_2)	21.4	13.6	80	$\mu g/m^3$
3.	Carbon Monoxide (CO)	1.23	2.03	4	$\mu g/m^3$
4.	Ammonia ($NH_{3)}$	BLQ (LOQ: 20)	BLQ (LOQ: 20)	400	$\mu g/m^3$
5.	Hydrogen Sulphide (H_2S)	BLQ (LOQ: 6)	BLQ (LOQ: 6)	Not specified	$\mu g/m^3$
6.	Carbon Dioxide (CO_2)	563	546	Not specified	ppm
7.	Methane (CH_4)	2.09	2.11	Not specified	ppm

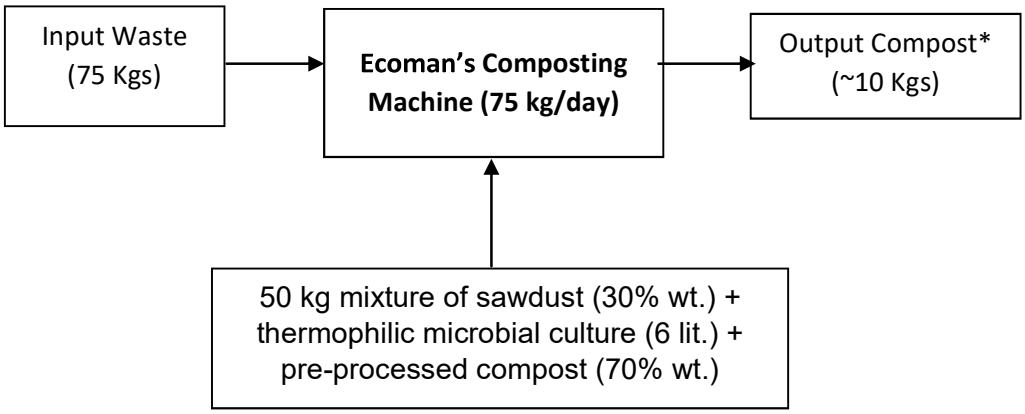
Table 4 : Analysis Results								
S. No.	**Parameter**	**Input Mixed Waste Characteristics**	**Sawdust + Microbial Characteristics**	**Compost Characteristics Already running machine 500 Kg- Stabilized Sample)**	**Compost Characteristics after 24 hours (Middle Section)**	**Compost Characteristics after 24 hours (Bottom Section)**	**SWM Standards for Compost**	**Unit**
A	**Physical Characteristics**							
1	Moisture	42.3	4.45	29	21.6	20	25	% by weight
2	Colour	Brown	Black	Black	Black	Black	Dark Brown to Black	-
3	Odour	Presence of foul odour	Presence of foul odour	Presence of foul odour	Presence of foul odour	Presence of foul odour	Absent	-
4	Particle Size	23	99.5	99.3	65.3	63	90% (< 4mm)	% by weight
5	Bulk Density	0.5477	0.6925	0.6799	0.5282	0.5782	< 1.0	g/cm^3
B	**Chemical Characteristics**							
6	Total Nitrogen (as N)	1.38	1.96	1.65	1.53	1.57	> 0.8	% by weight
7	Total Phosphate (as P_2O_5)	0.55	0.49	0.475	0.42	0.52	> 04	% by weight
8	Total Potassium (as K_2O)	0.37	0.57	1.14	0.24	0.52	> 0.4	% by weight
9	pH (1:2 Suspension)	4	4.63	5.67	4.72	4.69	6.5-7.5	-
10	Electrical Conductivity	4.78	7.70	4.82	6.57	6.60	< 4.0	dSm^{-1}
C	**Heavy metal concentration**							
11	Arsenic (as As)	BLQ (LOQ: 0.2)	BLQ (LOQ: 0.2)	BLQ (LOQ: 0.2)	BLQ (LOQ: 0.2)	BLQ (LOQ: 0.2)	< 10.0	mg/kg

12	Cadmium (as Cd)	1.18	1.19	1.36	1.26	1.19	< 5.0	mg/kg
13	Chromium (as Cr)	BLQ (LOQ: 2)	42.1	33.8	7.77	14	<50	mg/kg
14	Copper (as Cu)	3.07	6.93	12.7	6.30	4.79	<300	mg/kg
15	Mercury (as Hg)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	BLQ (LOQ: 0.1)	<0.15	mg/kg
16	Nickel (as Ni)	3.38	12.9	5.70	4.16	8.28	<50	mg/kg
17	Lead (as Pb)	9.37	9.37	9.19	11.3	8.92	< 100	mg/kg
18	Zinc (as Zn)	9.89	17.8	12.3	14	14.5	<1000	mg/kg
D	**Other Chemical Characteristics**							
19	Total Organic Carbon	55	55.2	54.4	55.2	55.2	> 12	% by weight
20	Carbon: Nitrogen Ratio	39.8	28.2	33	36	35.2	< 20	

2.4.2. Analytical Observations

(a) Results for pH, Electrical Conductivity, and C/N Ratio is exceeding in the fresh as well as the stabilized compost sample
(b) Particle size is complying with the stipulated standards for the stabilized compost sample but not for the fresh compost sample
(c) Moisture content is within the stipulated standards for fresh compost sample but exceeding the stipulated limits for the stabilized sample.
(d) Chromium concentration is below detectable limit in the waste sample. However, chromium has been detected in the added media. Chromium has also been detected in the fresh as well as stabilized compost sample.
(e) Concentration level of all monitored Ambient Air Quality parameters within stipulated limits
(f) Foul odour in ambient air has been reported in all the cases

2.5. Material and Water Balance



*Considering only material above the Green line from the Composting machine is being removed, remaining is left in the machined as per SOP

Figure 6: Material Balance chart

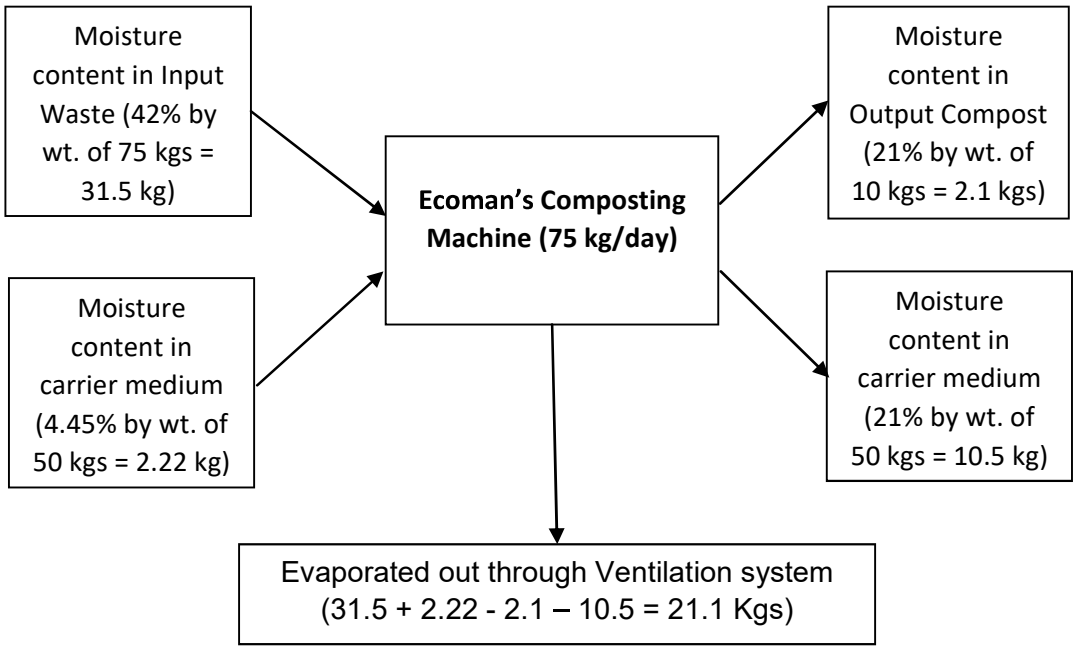


Figure 7: Water Balance chart

2.6. Chromium Balance

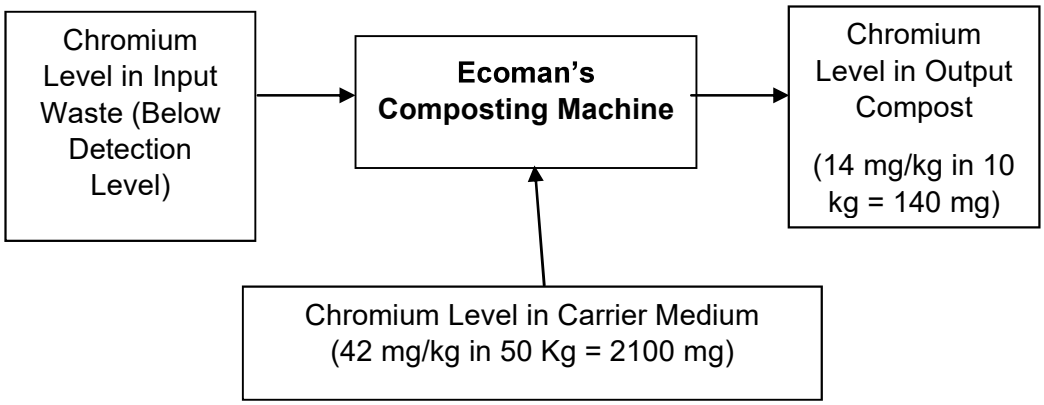


Figure 8: Chromium Balance (based on analysis reports)

2.7. Conclusions

i. Ecoman's Composting machine is fully automatic and compact in size.

ii. The machine is effectively able to compost the waste. Parallel study without the bacterial culture has been done by National Chemical Laboratory (NCL), Pune where it had been reported that without the bacterial culture present in the system, the organic waste does not convert into compost. The findings of NCL Pune are being shared here as **Annexure V.**

iii. Concentration level of all monitored Ambient Air Quality parameters within stipulated limits. However, foul odour was reported in the vicinity of the composting machine

iv. There is no water pollution as all excess water is evaporated in the composting process.

v. The composting technology is an energy intensive process, i.e. Rs. 2 / kg, is observed to be the operation cost, as per the power rating/consumption, of the machine. It is observed that ~21 kg of water (in the form of moisture) is lost through evaporation indicating that substantial energy is used for evaporating water. Also as per the SOP provided by the project proponent, volume reduction of 80 – 90% is achieved through evaporation in the composting machine.

vi. Results for pH, Electrical Conductivity, C/N Ratio is exceeding in the fresh as well as the stabilized compost sample.

vii. Particle size is complying with the stipulated standards for the stabilized compost sample but not for the fresh compost sample. within the specified standards of SWM 2016,

viii. Moisture content is within the stipulated standards for fresh compost sample but exceeding the stipulated limits for the stabilized sample

ix. Concentration of heavy metals such as arsenic, chromium, cadmium, lead, zinc, mercury, copper was all reported within the specified standards

as specified in Fertilizer Control Order and Solid Waste Management Rules, 2016.

x. Chromium concentration is below detectable limit in the input organic waste sample. However, chromium has been detected in the added carrier media (sawdust + microbial culture + pre-processed compost). Chromium has also been detected in the fresh as well as stabilized compost sample.

xi. Non-conformities w.r.t concentration levels of pH & Total Chromium have been reported by MPCB in the matter.

xii. It was observed that compost produced from the machine also contains plastic

xiii. The following measures may be taken to improve the quality of compost:

- Only segregated waste to be processed in the machine.
- Adjustment of pH in the final product
- Elimination of source of Chromium in the carrier media
- Odour control measures.
- Optimize C/N ratio to ensure it is within the stipulated limits.
- Proper O&M measures to ensure moisture content is within limits
- Sieving / grinding measures to ensure that the compost sizing is within stipulated limits

xiv. The technology claims to provide compost for use within 24 hrs processing of organic waste. However, according to SOP (**Annexure II**), it takes about 3-4 weeks for ramping up the machine after initial commissioning. Clear instructions may be included in the SOP.

xv. In view of above, composting technology adopted by M/s. Ecoman Enviro Solutions, may be used for processing solid waste post implementation of aforementioned measures. It can be used in areas where properly segregated solid waste can be made available and proper operation & maintenance of the process can be ensured.

xvi. The technology shall be more viable for decentralized waste processing systems, such as home composting, hotels & restaurants , office complexes etc. wherein the high cost of operation can be offset by elimination / minimization of the transportation cost of the waste

Annexure-I

Study Protocol – M/s. Ecoman Ltd.

The study protocol for carrying out the study is given below:

1. **Production Process**

   1.1. Input waste Stream

   - Batch size (kg)
   - Freshwater consumption (L) per batch
   - Minimum Required Moisture Content per batch.
   - Level of Segregation required
   - Qty and characterization of Biomass/ bioculture used per batches
   - Qty of Sawdust used per batch

   1.2. Process details

   - Duration of processing waste per batch
   - Process optimum Temperature & control (external & internal)
   - Duration for inducing external heat per batch
   - Efficiency of composting with change in moisture and temperature

   1.3. Output Stream

   - Qty. (Kg) of compost generated per batch
   - Qty. of Waste water generated (L) per batch
   - Quality of compost thus produced with reference to standards prescribed in SWM rules, 2016.

2. **Analysis of waste streams**

   Waste water: BOD, COD, TSS, pH, TDS, O&G

   Ambient Air: Odour observed (Yes/ No)

3. **Preparation of Material Balance Chart**

4. **Other details:**

   - Processing capacity range
   - Details of use & marketability of the compost products

Note:

- The proponent shall engage an NABL accredited laboratory for carrying out the monitoring/ analysis during trial run as per the protocol. Cost of analysis shall be borne by proponent; however, the laboratory shall submit results directly to CPCB & SPCB for evaluation. Further, depending on suitability CPCB/SPCBs may collect samples for cross checking or comparison with analysis of NABL labs.
- It shall be the responsibility of the proponent to take all safeguards while handling, transportation, storage, utilization etc. of the waste during run, so as to avoid accidents, environmental damages etc. In the event of such accidents/damages, the proponent shall have sole responsibility and liability of the same.

Annexure-II

Ecoman Enviro Solutions Pvt Ltd

Composting machine (FOODIE)
Standard Operating Procedure

Introduction:

This Standard Operating Procedure includes,

- ✓ About Foodie
- ✓ Operating procedure -
  Ramping of composting machine
- ✓ Indications on Display (HMI)
- ✓ Removal and Use of Compost
- ✓ For User's Safety
- ✓ Caution

How Composting Machine Foodie Works:

Composting is a biological process in which microorganisms (bacteria) convert organic waste into compost. The compost looks like dry soil and is an excellent medium for growing plants.

Ecoman's 'FOODIE' is a fully automatic composting machine which uses special microorganisms to break down and decompose all kinds of organic waste into compost within 24 hrs with a volume reduction of 85-90%.

The entire process is natural and biological. Our special microorganisms thrive in high temperature and even in high acidic or salty conditions. The 'FOODIE' has a U-shaped composting tank, with a humidity sensor, heater, mixing blades and an exhaust system.

ECOMAN ENVIRO SOLUTIONS PRIVATE LIMITED

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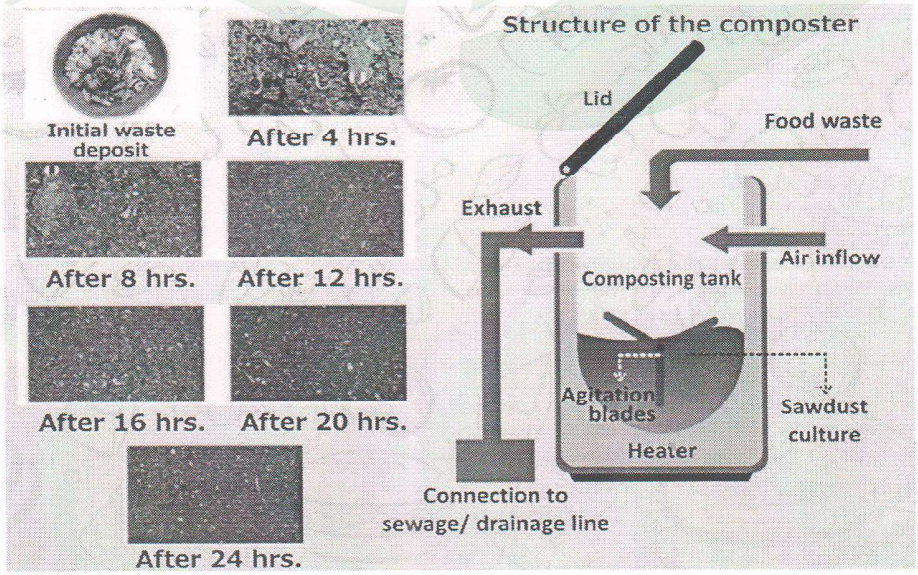
When Organic Waste is added to the FOODIE, moisture is sensed by the humidity sensor, due to which heater turns ON and the composting tank gets heated. Due to this, the water content in the organic waste is evaporated and it goes out to the atmosphere as water vapor through the exhaust system. As any organic (food) waste contains 70-80% water content, we achieve 70-80% volume reduction at this stage itself. At the same time our special microorganisms decompose the remaining organic waste into compost within 24 hours. That's how we achieve 85-90% volume reduction. The process is completely noiseless as there is no crushing or grinding involved. The blades are just for evenly mixing the waste.



Requirements Before Operation of Foodie:

Segregation of Waste:

- Before adding the garbage should be segregated properly.

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- Please remove excess water by gravity in the kitchen or wasting area. This can be done by making holes in the garbage bin & keeping in wasting area to drain excess water by gravity for 1 hr.

Starting the Machine for the First Time:

- Make sure that the power supply of the machine and Exhaust pipe connected properly.
- Check the Supply Voltage the voltage should be balance in all the three phase (400 V – 440 V)
- Ensure that the neutral & earthing connection should be connected properly.
- Turn on the MCB.Check the SPP relay if it shows phase reverse (i.e. The SPP LED blinks) turn off the MCB and change any one of the phase sequence if it is R Y B then change it to R B Y.

Procedure:

- Ensure that machine should be in "AUTO" mode. For normal working and operation of machine it has to be always in auto mode.
- If it is manual mode it will not function. Manual mode is only for removing the compost. IF MACHINE IS FOUND TO BE IN MANUAL MODE CHANGE TO AUTO MODE.
- Turn ON the MCB then Release the emergency stop button.
- The machine will show power on indicator on the Display screen.
- Open the Top Door (Waste input door).
- When you open the top door pop up message will be displayed in the main screen indicating that the top door is open. At that time the motor, heater and blower will be turned off.
- Close the top door properly; add segregated organic waste as per prescribed capacity that you have purchased.
- The motor ,Heater & Blower will Turn On simultanesouly and functions as per the program in the PLC.

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Ramping of Composting Machine:

- After installation follow this procedure for effective performance of the machine.

For 1st Week	Add only 25% organic waste of the machine capacity
For 2nd Week	Add only 50% organic waste of the machine capacity
For 3rd Week	Add only 75% organic waste of the machine capacity
For 4th Week	Add only 100% organic waste of the machine capacity
After 4th week	Add organic waste as per the machine's capacity

Power Mode:

- In Power Mode the Blower Motor, Heater and the Main Motor will show ON Indicator.

Power Saving Mode:

- The Power saving mode indicator will turn ON after completion of the decomposition process.

Manual Mode:

- This indicator will turn ON when we turn the key to manual Mode.
- Manual Mode is used for removal of compost.

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Auto Manual Switch

Note:

- If the compost inside the Foodie looks wet and sloppy, stop adding organic waste until it becomes dry.
- Please do not exceed maximum daily capacity of the Foodie while adding waste; else it will cause the machine to overload.

Removal of Compost:

1. The machine is having two level markings for removal of compost. The compost needs to be removed when it reaches the Green marking inside the composting tank.
2. Also check that you remove the compost before it reaches the Red marking as Red marking is an indicator of overloading the machine.
3. To remove the compost, turn the key switch to manual mode. In the manual mode, the motor rotates in one direction, so that the compost easily falls out from the compost door.
4. Open the compost door (Front door) for removal of the compost. Use a bag/bin/bucket for collecting the compost.

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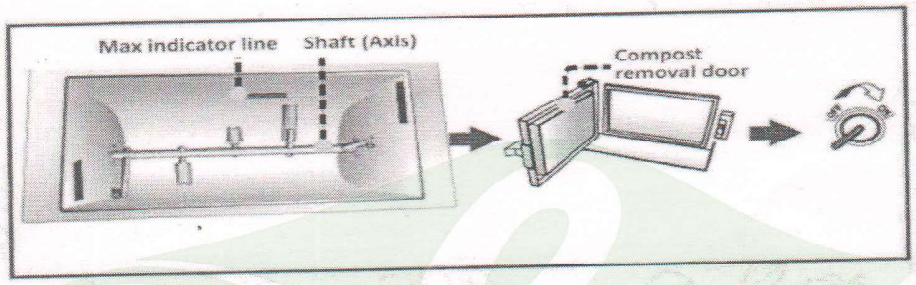
5. Ensure compost is removed only up to shaft's top surface. It is necessary to maintain the compost till shaft level for effective composting in next cycle. **Please do not empty the entire tank.**
6. After removal of the compost, **turn the key switch back to auto mode and close the compost door.**



⚠ Notice

Do not remove all of the compost even when you need to clean the machine. (Without the compost, there are no microbes, and decomposing will not occur)

Use of Compost:

1. The quality of compost depends on the quality of organic waste. Foodie itself does not produce any nutrients/parameters of the compost and the machine is like an incubator, creating perfect conditions for the microorganisms to grow, which decompose the organic waste and covert into compost. Therefore, for good quality compost as per SWM Rules 2016 it is imperative to have balanced organic waste.
2. The compost is a soil additive and provides nutrients to the plants just like any other manure/fertilizer. But the compost is not a ready to use manure/fertilizer.

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Just like any other soil additive/manure/fertilizer, the proportion of compost from Foodie should be in proportional quantity.

3. It is recommended to use the compost after storing it for three weeks.
4. For using the compost immediately after removal, add it in a small quantity after removing soil's top layer with a ratio of 1:5 or 1:10 in proportion to the top soil.

Mix well with the top soil and spread evenly around the plant.

5. For further improving the quality of compost, mix the Compost with crushed/shredded dried leaves in the ratio of 2:1 (Compost : dried leaves)

For User Safety:

- Over load Function – machine will stop in case of overload / over current /Under voltage.
- Indicators are provided for Power, Power saving mode, Motor On, heater ON & Temperature.
- Internal mixing blades automatically stop when waste Top door or compost removal door is opened. Magnetic Limit Switch is provided for Personnel safety.
- Emergency stop button is provided in case of any emergency.

Caution:

- There should not be any joints to the power cables.
- Make sure that the power cable doesn't get pressed or damage by something.
- Do not disassemble, repair or rebuild if you are not an authorized person. Do not open the Control Panel and touch the Electrical components if you are not an authorized person.
- If the mixing blades keep moving even when you open the top door / compost door, stop power supply and contact Service Department.
- If repaired or touched by any unauthorized person the warranty will be void.

National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

ASHWAMEDH ENGINEERS & CONSULTANTS LABORATORY SERVICES DIVISION

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

SURVEY NO. 102, PLOT NO. 26, WADALA PATHARDI ROAD, NASHIK, MAHARASHTRA, INDIA

in the field of

TESTING

Certificate Number: TC-5509

Issue Date: 23/11/2021 **Valid Until:** 22/11/2023

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.

(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Identity : ASHWAMEDH ENGINEERS & CONSULTANTS

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

Ashwamedh Engineers & Consultants
Laboratory Services Division
TC-5509
Ashwamedh Engineers & Consultants
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sales@ashwamedh.net +91-253-2392225

TEST REPORT

ULR-TC550923000003331F

Sample ID : FR/02/23/019	FR/02/23/019	Report Date	02/03/2023
Name and Address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** Gat - 1002, MSR Queenstown, Chinchwad, Pune – 411033 Maharashtra		
Sampling done by	Customer	Sample Description/Type	Compost (Organic Fertilizer)
Sampling Location	Input Mixed Waste Characteristics	Date - Receipt of Sample	22/02/2023
Sample Quantity / Packing	1 kg x 1 no. plastic container	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No.: AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	01/03/2023

Sr. No.	Parameter	Result	Unit	Method
Chemical Testing; Group: Fertilizer				
A	***Physical Characteristics***			
1.	Moisture	**42.3**	% by weight	FCO, Schedule IV, Part D-2, Page no. 218
2.	Colour	**Brown**	-	AEC/C/SAP/OF-6
3.	Odour	**Presence of foul odour**	-	AEC/C/SAP/OF-6
4.	Particle Size	**23**	% by weight	FCO, Schedule II, Part B-20, Page No.161
5.	Bulk Density	**0.5477**	g/cm^3	FCO, Schedule IV, Part D-3, Page no. 218
B	***Chemical Characteristics***			
6.	Total Nitrogen (as N)	**1.38**	% by weight	FCO, Schedule IV, Part D-6, Page no. 219
7.	Total Phosphate (as P_2O_5)	**0.55**	% by weight	FCO, Schedule IV Part D-8, Page no. 219
8.	Total Potassium (as K_2O)	**0.37**	% by weight	FCO, Schedule IV, Part D-9, Page no. 219
9.	pH (1:2 Suspension)	**4**	-	FCO, Schedule IV, Part D-1, Page no.218
10.	Electrical Conductivity	**4.78**	dSm^{-1}	FCO, Schedule IV, Part D-4, Page no. 218
C	***Heavy metal content***			
11.	Arsenic (as As)	**BLQ (LOQ:0.2)**	mg/kg	FCO, Schedule IV, Part D-12, Page no. 222
12.	Cadmium (as Cd)	**1.18**	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
13.	Chromium (as Cr)	**BLQ (LOQ:2)**	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
14.	Copper (as Cu)	**3.07**	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
15.	Mercury (as Hg)	**BLQ (LOQ:0.1)**	mg/kg	FCO, Schedule IV, Part D-11, Page no. 221
16.	Nickel (as Ni)	**3.38**	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
17.	Lead (as Pb)	**9.37**	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
18.	Zinc (as Zn)	**9.89**	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
Note: Sample ID FR/02/23/019 bears two Test Reports - FR/02/23/019 and FR/02/23/019N

Ninad Soundankar
Technical Manager (Chemical)
Reviewed & Authorised by

Ashwamedh Engineers & Consultants
Laboratory Services Division

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Laboratory Services Division

TC-5509

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ULR-TC550923000003331F

Sample ID : FR/02/23/019	FR/02/23/019	Report Date	02/03/2023

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Laboratory Services Division

End of Report

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TEST REPORT

Sample ID : FR/02/23/019	FR/02/23/019N	Report Date	02/03/2023
Name and Address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** Gat - 1002, MSR Queenstown, Chinchwad, Pune – 411033 Maharashtra		
Sampling done by	Customer	Sample Description/Type	Organic Fertilizer (Compost)
Sampling Location	Input Mixed Waste Characteristics	Date - Receipt of Sample	22/02/2023
Sample Quantity / Packing	1 kg x 1 no. plastic container	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No.: AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	01/03/2023

Sr. No.	Parameter	Result	Unit	Method
Chemical Testing; Group: Fertilizer				
B	***Chemical Characteristics***			
1.	Total Organic Carbon	**55**	% by weight	FCO, Schedule IV Part D-5, Page no. 219
2.	Carbon:Nitrogen Ratio	**39.8**	-	FCO, Schedule IV, Part D-7, Page no. 219

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
Note: Sample ID FR/02/23/019 bears two Test Reports - FR/02/23/019 and FR/02/23/019N

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TEST REPORT

ULR-TC550923000003332F

Sample ID : FR/02/23/020	FR/02/23/020	Report Date	02/03/2023
Name and Address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** Gat - 1002, MSR Queenstown, Chinchwad, Pune – 411033 Maharashtra		
Sampling done by	Customer	Sample Description/Type	Compost (Organic Fertilizer)
Sampling Location	Sawdust + Microbial Culture Characteristics	Date - Receipt of Sample	22/02/2023
Sample Quantity / Packing	1 kg x 1 no. plastic container	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No.: AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	01/03/2023

Sr. No.	Parameter	Result	Unit	Method
Chemical Testing; Group: Fertilizer				
A	***Physical Characteristics***			
1.	Moisture	**4.45**	% by weight	FCO, Schedule IV, Part D-2, Page no. 218
2.	Colour	**Black**	-	AEC/C/SAP/OF-6
3.	Odour	**Presence of foul odour**	-	AEC/C/SAP/OF-6
4.	Particle Size	**99.5**	% by weight	FCO, Schedule II, Part B-20, Page No.161
5.	Bulk Density	**0.6925**	g/cm^3	FCO, Schedule IV, Part D-3, Page no. 218
B	***Chemical Characteristics***			
6.	Total Nitrogen (as N)	**1.96**	% by weight	FCO, Schedule IV, Part D-6, Page no. 219
7.	Total Phosphate (as P_2O_5)	**0.49**	% by weight	FCO, Schedule IV Part D-8, Page no. 219
8.	Total Potassium (as K_2O)	**0.57**	% by weight	FCO, Schedule IV, Part D-9, Page no. 219
9.	pH (1:2 Suspension)	**4.63**	-	FCO, Schedule IV, Part D-1, Page no.218
10.	Electrical Conductivity	**7.70**	dSm^{-1}	FCO, Schedule IV, Part D-4, Page no. 218
C	***Heavy metal content***			
11.	Arsenic (as As)	**BLQ (LOQ:0.2)**	mg/kg	FCO, Schedule IV, Part D-12, Page no. 222
12.	Cadmium (as Cd)	**1.19**	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
13.	Chromium (as Cr)	**42.1**	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
14.	Copper (as Cu)	**6.93**	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
15.	Mercury (as Hg)	**BLQ (LOQ:0.1)**	mg/kg	FCO, Schedule IV, Part D-11, Page no. 221
16.	Nickel (as Ni)	**12.9**	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
17.	Lead (as Pb)	**9.37**	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
18.	Zinc (as Zn)	**17.8**	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
Note: Sample ID FR/02/23/020 bears two Test Reports - FR/02/23/020 and FR/02/23/020N

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ULR-TC550923000003332F

Sample ID : FR/02/23/020	FR/02/23/020	Report Date	02/03/2023

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---------- **End of Report** ----------

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TEST REPORT

Sample ID : FR/02/23/020	FR/02/23/020N	Report Date	02/03/2023
Name and Address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** Gat - 1002, MSR Queenstown, Chinchwad, Pune – 411033 Maharashtra		
Sampling done by	Customer	Sample Description/Type	Organic Fertilizer (Compost)
Sampling Location	Sawdust + Microbial Culture Characteristics	Date - Receipt of Sample	22/02/2023
Sample Quantity / Packing	1 kg x 1 no. plastic container	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No.: AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	01/03/2023

Sr. No.	Parameter	Result	Unit	Method
Chemical Testing; Group: Fertilizer				
B	***Chemical Characteristics***			
1.	Total Organic Carbon	**55.2**	% by weight	FCO, Schedule IV Part D-5, Page no. 219
2.	Carbon:Nitrogen Ratio	**28.2**	-	FCO, Schedule IV, Part D-7, Page no. 219

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
Note: Sample ID FR/02/23/020 bears two Test Reports - FR/02/23/020 and FR/02/23/020N

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TEST REPORT

ULR-TC550923000003333F

Sample ID : FR/02/23/021	FR/02/23/021	Report Date	02/03/2023
Name and Address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** Gat - 1002, MSR Queenstown, Chinchwad, Pune – 411033 Maharashtra		
Sampling done by	Customer	Sample Description/Type	Compost (Organic Fertilizer)
Sampling Location	Compost Characteristics of ECOMAN – 500 kg machine Established	Date - Receipt of Sample	22/02/2023
Sample Quantity / Packing	1 kg x 1 no. plastic container	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No.: AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	01/03/2023

Sr. No.	Parameter	Result	Specifications for City Compost as per Fertiliser (Control) Third Amendment Order, 2017 Schedule IV, Part A	Specifications for Organic Compost as per MoEFCC Solid Waste Management Rules, 2016 Schedule -II	Unit	Method
Chemical Testing; Group: Fertilizer						
A	***Physical Characteristics***					
1.	Moisture	**29**	Max. 25	Max. 25	% by weight	FCO, Schedule IV, Part D-2, Page no. 218
2.	Colour	**Black**	Dark brown to black	Dark brown to black	-	AEC/C/SAP/01F-6
3.	Odour	**Presence of foul odour**	Absence of foul odour	Absence of foul odour	-	AEC/C/SAP/01F-6
4.	Particle Size	**99.3**	Minimum 90% material should pass through 4mm IS Sieve	Minimum 90% material should pass through 4mm IS Sieve	% by weight	FCO, Schedule II, Part B-20, Page No.161
5.	Bulk Density	**0.6799**	<1.0	<1.0	g/cm³	FCO, Schedule IV, Part D-3, Page no. 218
B	***Chemical Characteristics***					
6.	Total Nitrogen (as N)	**1.65**	*Min.*1.2	$ Min. 0.8	% by weight	FCO, Schedule IV, Part D-6, Page no. 219
7.	Total Phosphate (as P_2O_5)	**0.475**		$ Min. 0.4	% by weight	FCO, Schedule IV Part D-8, Page no. 219
8.	Total Potassium (as K_2O)	**1.14**		$ Min. 0.4	% by weight	FCO, Schedule IV, Part D-9, Page no. 219
9.	pH (1:2 Suspension)	**5.97**	6.5 – 7.5	6.5 -7.5	-	FCO, Schedule IV, Part D-1, Page no.218
10.	Electrical Conductivity	**4.82**	Not more than 4.0	Not more than 4.0	dSm^{-1}	FCO, Schedule IV, Part D-4, Page no. 218
C	***Heavy metal content***					
11.	Arsenic (as As)	**BLQ (LOQ:0.2)**	*Max.* 10	Max. 10	mg/kg	FCO, Schedule IV, Part D-12, Page no. 222
12.	Cadmium (as Cd)	**1.36**	*Max.* 5	Max. 5	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
13.	Chromium (as Cr)	**33.8**	*Max.* 50	Max. 50	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220

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ULR-TC550923000003333F

Sample ID : FR/02/23/021	FR/02/23/021	Report Date	02/03/2023

Sr. No.	Parameter	Result	Specifications for City Compost as per Fertiliser (Control) Third Amendment Order, 2017 Schedule IV, Part A	Specifications for Organic Compost as per MoEFCC Solid Waste Management Rules, 2016 Schedule -II	Unit	Method
14.	Copper (as Cu)	**12.7**	*Max.* 300	Max. 300	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
15.	Mercury (as Hg)	**BLQ (LOQ:0.1)**	*Max.* 0.15	Max. 0.15	mg/kg	FCO, Schedule IV, Part D-11, Page no. 221
16.	Nickel (as Ni)	**5.70**	*Max.* 50	Max. 50	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
17.	Lead (as Pb)	**9.19**	*Max.* 100	Max. 100	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
18.	Zinc (as Zn)	**12.3**	*Max.* 1000	Max. 1000	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
$: Total NPK MoEFCC Limit is Minimum 1.2 g/100g (%).
Note: Sample ID FR/02/23/021 bears two Test Reports - FR/02/23/021 and FR/02/23/021N

Ninad Soundankar
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TEST REPORT

Sample ID : FR/02/23/021	FR/02/23/021N	Report Date	02/03/2023
Name and Address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** Gat - 1002, MSR Queenstown, Chinchwad, Pune – 411033 Maharashtra		
Sampling done by	Customer	Sample Description/Type	Organic Fertilizer (Compost)
Sampling Location	Compost Characteristics of ECOMAN – 500 kg machine Established	Date - Receipt of Sample	22/02/2023
Sample Quantity / Packing	1 kg x 1 no. plastic container	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No.: AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	01/03/2023

Sr. No.	Parameter	Result	Specifications for City Compost as per Fertiliser (Control) Third Amendment Order, 2017 Schedule IV, Part A	Specifications for Organic Compost as per MoEFCC Solid Waste Management Rules, 2016 Schedule -II	Unit	Method
Chemical Testing; Group: Fertilizer						
B	***Chemical Characteristics***					
1.	Total Organic Carbon	**54.4**	*Min.* 12.0	Min.12.0	% by weight	FCO, Schedule IV Part D-5, Page no. 219
2.	Carbon:Nitrogen Ratio	**33**	<20	<20	-	FCO, Schedule IV, Part D-7, Page no. 219

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
$: Total NPK MoEFCC Limit is Minimum 1.2 g/100g (%).
Note: Sample ID FR/02/23/021 bears two Test Reports - FR/02/23/021 and FR/02/23/021N

Ninad Soundankar
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TEST REPORT

ULR-TC550923000003334F

Sample ID : FR/02/23/022	FR/02/23/022	Report Date	02/03/2023
Name and Address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** Gat - 1002, MSR Queenstown, Chinchwad, Pune – 411033 Maharashtra		
Sampling done by	Customer	Sample Description/Type	Compost (Organic Fertilizer)
Sampling Location	Compost Characteristics after 24 hours (Middle Section- ECOMAN 75 kg)	Date - Receipt of Sample	22/02/2023
Sample Quantity / Packing	1 kg x 1 no. plastic container	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No.: AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	01/03/2023

Sr. No.	Parameter	Result	Specifications for City Compost as per Fertiliser (Control) Third Amendment Order, 2017 Schedule IV, Part A	Specifications for Organic Compost as per MoEFCC Solid Waste Management Rules, 2016 Schedule -II	Unit	Method
Chemical Testing; Group: Fertilizer						
A	***Physical Characteristics***					
1.	Moisture	**21.6**	Max. 25	Max. 25	% by weight	FCO, Schedule IV, Part 0-2, Page no. 218
2.	Colour	**Black**	Dark brown to black	Dark brown to black	-	AEC/C/SAP/OF-6
3.	Odour	**Presence of foul odour**	Absence of foul odour	Absence of foul odour	-	AEC/C/SAP/OF-6
4.	Particle Size	**65.3**	Minimum 90% material should pass through 4mm IS Sieve	Minimum 90% material should pass through 4mm IS Sieve	% by weight	FCO, Schedule II, Part 0-20, Page No.161
5.	Bulk Density	**0.5282**	<1.0	<1.0	g/cm^3	FCO, Schedule IV, Part 0-3, Page no. 218
B	***Chemical Characteristics***					
6.	Total Nitrogen (as N)	**1.53**	*Min.*1.2	$ Min. 0.8	% by weight	FCO, Schedule IV, Part 0-6, Page no. 219
7.	Total Phosphate (as P_2O_5)	**0.42**		$ Min. 0.4	% by weight	FCO, Schedule IV Part 0-8, Page no. 219
8.	Total Potassium (as K_2O)	**0.24**		$ Min. 0.4	% by weight	FCO, Schedule IV, Part 0-9, Page no. 219
9.	pH (1:2 Suspension)	**4.72**	6.5 – 7.5	6.5 -7.5	-	FCO, Schedule IV, Part 0-1, Page no.218
10.	Electrical Conductivity	**6.57**	Not more than 4.0	Not more than 4.0	dSm^{-1}	FCO, Schedule IV, Part 0-4, Page no. 218
C	***Heavy metal content***					
11.	Arsenic (as As)	**BLQ (LOQ:0.2)**	*Max.* 10	Max. 10	mg/kg	FCO, Schedule IV, Part 0-12, Page no. 222
12.	Cadmium (as Cd)	**1.26**	*Max.* 5	Max. 5	mg/kg	FCO, Schedule IV, Part 0-10, Page no. 220
13.	Chromium (as Cr)	**7.77**	*Max.* 50	Max. 50	mg/kg	FCO, Schedule IV, Part 0-10, Page no. 220

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ULR-TC550923000003334F

Sample ID : FR/02/23/022	FR/02/23/022	Report Date	02/03/2023

Sr. No.	Parameter	Result	Specifications for City Compost as per Fertiliser (Control) Third Amendment Order, 2017 Schedule IV, Part A	Specifications for Organic Compost as per MoEFCC Solid Waste Management Rules, 2016 Schedule -II	Unit	Method
14.	Copper (as Cu)	**6.30**	*Max.* 300	Max. 300	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
15.	Mercury (as Hg)	**BLQ (LOQ:0.1)**	*Max.* 0.15	Max. 0.15	mg/kg	FCO, Schedule IV, Part D-11, Page no. 221
16.	Nickel (as Ni)	**4.16**	*Max.* 50	Max. 50	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
17.	Lead (as Pb)	**11.3**	*Max.* 100	Max. 100	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
18.	Zinc (as Zn)	**14**	*Max.* 1000	Max. 1000	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
$: Total NPK MoEFCC Limit is Minimum 1.2 g/100g (%).
Note: Sample ID FR/02/23/022 bears two Test Reports - FR/02/23/022 and FR/02/23/022N

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TEST REPORT

Sample ID : FR/02/23/022	FR/02/23/022N	Report Date	02/03/2023
Name and Address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** Gat - 1002, MSR Queenstown, Chinchwad, Pune – 411033 Maharashtra		
Sampling done by	Customer	Sample Description/Type	Organic Fertilizer (Compost)
Sampling Location	Compost Characteristics after 24 hours (Middle Section- ECOMAN 75 kg)	Date - Receipt of Sample	22/02/2023
Sample Quantity / Packing	1 kg x 1 no. plastic container	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No.: AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	01/03/2023

Sr. No.	Parameter	Result	Specifications for City Compost as per Fertiliser (Control) Third Amendment Order, 2017 Schedule IV, Part A	Specifications for Organic Compost as per MoEFCC Solid Waste Management Rules, 2016 Schedule -II	Unit	Method
Chemical Testing; Group: Fertilizer						
B	***Chemical Characteristics***					
1.	Total Organic Carbon	**55.2**	*Min.* 12.0	Min.12.0	% by weight	FCO, Schedule IV Part D-5, Page no. 219
2.	Carbon:Nitrogen Ratio	**36**	<20	<20	-	FCO, Schedule IV, Part D-7, Page no. 219

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
$: Total NPK MoEFCC Limit is Minimum 1.2 g/100g (%).
Note: Sample ID FR/02/23/022 bears two Test Reports - FR/02/23/022 and FR/02/23/022N

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TEST REPORT

ULR-TC550923000003335F

Sample ID : FR/02/23/023	FR/02/23/023	Report Date	02/03/2023
Name and Address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** Gat - 1002, MSR Queenstown, Chinchwad, Pune – 411033 Maharashtra		
Sampling done by	Customer	Sample Description/Type	Compost (Organic Fertilizer)
Sampling Location	Compost characteristics after 24 hours (Bottom Section - ECOMAN 75 kg)	Date - Receipt of Sample	22/02/2023
Sample Quantity / Packing	1 kg x 1 no. plastic container	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No.: AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	01/03/2023

Sr. No.	Parameter	Result	Specifications for City Compost as per Fertiliser (Control) Third Amendment Order, 2017 Schedule IV, Part A	Specifications for Organic Compost as per MoEFCC Solid Waste Management Rules, 2016 Schedule -II	Unit	Method
Chemical Testing; Group: Fertilizer						
A	***Physical Characteristics***					
1.	Moisture	**20**	Max. 25	Max. 25	% by weight	FCO, Schedule IV, Part D-2, Page no. 218
2.	Colour	**Black**	Dark brown to black	Dark brown to black	-	AEC/C/SAP/OF-6
3.	Odour	**Presence of foul odour**	Absence of foul odour	Absence of foul odour	-	AEC/C/SAP/OF-6
4.	Particle Size	**63**	Minimum 90% material should pass through 4mm IS Sieve	Minimum 90% material should pass through 4mm IS Sieve	% by weight	FCO, Schedule II, Part B-20, Page No.161
5.	Bulk Density	**0.5782**	<1.0	<1.0	g/cm^3	FCO, Schedule IV, Part D-3, Page no. 218
B	***Chemical Characteristics***					
6.	Total Nitrogen (as N)	**1.57**	*Min.*1.2	$ Min. 0.8	% by weight	FCO, Schedule IV, Part D-6, Page no. 219
7.	Total Phosphate (as P_2O_5)	**0.52**		$ Min. 0.4	% by weight	FCO, Schedule IV Part D-8, Page no. 219
8.	Total Potassium (as K_2O)	**0.52**		$ Min. 0.4	% by weight	FCO, Schedule IV, Part D-9, Page no. 219
9.	pH (1:2 Suspension)	**4.69**	6.5 – 7.5	6.5 -7.5	-	FCO, Schedule IV, Part D-1, Page no.218
10.	Electrical Conductivity	**6.60**	Not more than 4.0	Not more than 4.0	dSm^{-1}	FCO, Schedule IV, Part D-4, Page no. 218
C	***Heavy metal content***					
11.	Arsenic (as As)	**BLQ (LOQ:0.2)**	*Max.* 10	Max. 10	mg/kg	FCO, Schedule IV, Part D-12, Page no. 222
12.	Cadmium (as Cd)	**1.19**	*Max.* 5	Max. 5	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
13.	Chromium (as Cr)	**14**	*Max.* 50	Max. 50	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220

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ULR-TC550923000003335F

Sample ID : FR/02/23/023	FR/02/23/023	Report Date	02/03/2023

Sr. No.	Parameter	Result	Specifications for City Compost as per Fertiliser (Control) Third Amendment Order, 2017 Schedule IV, Part A	Specifications for Organic Compost as per MoEFCC Solid Waste Management Rules, 2016 Schedule -II	Unit	Method
14.	Copper (as Cu)	**4.79**	*Max.* 300	Max. 300	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
15.	Mercury (as Hg)	**BLQ (LOQ:0.1)**	*Max.* 0.15	Max. 0.15	mg/kg	FCO, Schedule IV, Part D-11, Page no. 221
16.	Nickel (as Ni)	**8.28**	*Max.* 50	Max. 50	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
17.	Lead (as Pb)	**8.92**	*Max.* 100	Max. 100	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220
18.	Zinc (as Zn)	**14.5**	*Max.* 1000	Max. 1000	mg/kg	FCO, Schedule IV, Part D-10, Page no. 220

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
$: Total NPK MoEFCC Limit is Minimum 1.2 g/100g (%).
Note: Sample ID FR/02/23/023 bears two Test Reports - FR/02/23/023 and FR/02/23/023N

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TEST REPORT

Sample ID : FR/02/23/023	FR/02/23/023N	Report Date	02/03/2023
Name and Address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** Gat - 1002, MSR Queenstown, Chinchwad, Pune – 411033 Maharashtra		
Sampling done by	Customer	Sample Description/Type	Organic Fertilizer (Compost)
Sampling Location	Compost characteristics after 24 hours (Bottom Section - ECOMAN 75 kg)	Date - Receipt of Sample	22/02/2023
Sample Quantity / Packing	1 kg x 1 no. plastic container	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No.: AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	01/03/2023

Sr. No.	Parameter	Result	Specifications for City Compost as per Fertiliser (Control) Third Amendment Order, 2017 Schedule IV, Part A	Specifications for Organic Compost as per MoEFCC Solid Waste Management Rules, 2016 Schedule -II	Unit	Method
Chemical Testing; Group: Fertilizer						
B	***Chemical Characteristics***					
1.	Total Organic Carbon	**55.2**	*Min.* 12.0	Min.12.0	% by weight	FCO, Schedule IV Part D-5, Page no. 219
2.	Carbon:Nitrogen Ratio	**35.2**	<20	<20	-	FCO, Schedule IV, Part D-7, Page no. 219

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
$: Total NPK MoEFCC Limit is Minimum 1.2 g/100g (%).
Note: Sample ID FR/02/23/023 bears two Test Reports - FR/02/23/023 and FR/02/23/023N

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Annexure-IV

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AMBIENT AIR QUALITY MONITORING REPORT

Sample ID : AA/02/23/0500	Report No. AA/02/23/0500	Report Date	01/03/2023
Name and address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** G - 1002, MSR Queenstown, Chinchwad, Pune - 411033 Maharashtra		
Sampling done by	Laboratory	Sample Description / Type	Ambient Air
Sampling Location	Near Garden	Date - Sampling	20/02/2023 to 21/02/2023
Sample Quantity / Packing	SO_2, NO_2, H_2S: 30 ml x 6 no. plastic bottle each NH_3: 10 ml x 24 no. plastic bottle CO_2: 1 x 1 no. bladder CO: 1 x 1 no. bladder CH_4: 1 x 1 no. bladder	Date - Receipt of Sample	22/02/2023
Sampling Procedure	As per method reference	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No. AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	28/02/2023

Meteorological Data / Environmental Conditions

Average Wind Velocity	Wind Direction	Relative Humidity	Temperature	Duration of Survey
3 km/h	N	(Max./Min.): 69/35%	(Max./Min.): 31/15°C	24 h

Parameter	Result	NAAQS# 2009	Unit	Method
Chemical Testing; Group: Atmospheric Pollution				
Sulphur Dioxide (SO_2)	**7.80**	80	µg/m³	IS 5182 (Part 2): 2001
Nitrogen Dioxide (NO_2)	**21.4**	80	µg/m³	IS 5182 (Part 6): 2006
Carbon Monoxide (CO)	**1.23**	4	mg/m³	CPCB Guidelines, Volume II, 37/2012-13, Page no.16: 2013
Ammonia (NH_3)	**BLQ (LOQ:20)**	400	µg/m³	CPCB Guidelines, Volume I,36/2012-13, Page No.35: 2013
Hydrogen Sulphide (H_2S)	**BLQ (LOQ:6)**	Not specified	µg/m³	IS 5182 (Part VII): 1973

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
TWA : Time Weighted Average
: NAAQS (National Ambient Air Quality Standards (Industrial, Residential, Rural and other Area) specified as: 24 hours TWA in case of Sulphur Dioxide, Nitrogen Dioxide and Ammonia, 1 hour TWA in case of Carbon Monoxide.
Note: Sample ID AA/02/23/0500 bears two Test Reports-AA/02/23/0500 and AA/02/23/0500N

Kavita Shewale
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AMBIENT AIR QUALITY MONITORING REPORT

Sample ID : AA/02/23/0500	Report No. AA/02/23/0500N	Report Date	01/03/2023
Name and address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** G - 1002, MSR Queenstown, Chinchwad, Pune - 411033 Maharashtra		
Sampling done by	Laboratory	Sample Description / Type	Ambient Air
Sampling Location	Near Garden	Date - Sampling	20/02/2023 to 21/02/2023
Sample Quantity / Packing	SO_2, NO_2, H_2S: 30 ml x 6 no. plastic bottle each NH_3: 10 ml x 24 no. plastic bottle CO_2: 1 x 1 no. bladder CO: 1 x 1 no. bladder CH_4: 1 x 1 no. bladder	Date - Receipt of Sample	22/02/2023
Sampling Procedure	As per method reference	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No. AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	28/02/2023

Meteorological Data / Environmental Conditions

Average Wind Velocity	Wind Direction	Relative Humidity	Temperature	Duration of Survey
3 km/h	N	(Max./Min.): 69/35%	(Max./Min.): 31/15°C	24 h

Parameter	Result	NAAQS# 2009	Unit	Method
Chemical Testing; Group: Atmospheric Pollution				
Carbon Dioxide (CO_2)	**563**	Not specified	ppm	By GC-FID
Methane (CH_4)	**2.09**	Not specified	ppm	By GC-FID

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
TWA : Time Weighted Average
: NAAQS (National Ambient Air Quality Standards (Industrial, Residential, Rural and other Area) specified as: 24 hours TWA in case of Sulphur Dioxide, Nitrogen Dioxide and Ammonia, 1 hour TWA in case of Carbon Monoxide.
Note: Sample ID AA/02/23/0500 bears two Test Reports-AA/02/23/0500 and AA/02/23/0500N

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AMBIENT AIR QUALITY MONITORING REPORT

Sample ID : AA/02/23/0501	Report No. AA/02/23/0501	Report Date	01/03/2023
Name and address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** G - 1002, MSR Queenstown, Chinchwad, Pune - 411033 Maharashtra		
Sampling done by	Laboratory	Sample Description / Type	Ambient Air
Sampling Location	Building Back Side	Date - Sampling	20/02/2023 to 21/02/2023
Sample Quantity / Packing	SO_2, NO_2, H_2S: 30 ml x 6 no. plastic bottle each NH_3: 10 ml x 24 no. plastic bottle CO_2: 1 x 1 no. bladder CO: 1 x 1 no. bladder CH_4: 1 x 1 no. bladder	Date - Receipt of Sample	22/02/2023
Sampling Procedure	As per method reference	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No. AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	28/02/2023

Meteorological Data / Environmental Conditions

Average Wind Velocity	Wind Direction	Relative Humidity	Temperature	Duration of Survey
3 km/h	N	(Max./Min.): 69/35%	(Max./Min.): 31/15°C	24 h

Parameter	Result	NAAQS# 2009	Unit	Method
Chemical Testing; Group: Atmospheric Pollution				
Sulphur Dioxide (SO_2)	**BLQ (LOQ:4)**	80	µg/m³	IS 5182 (Part 2): 2001
Nitrogen Dioxide (NO_2)	**13.6**	80	µg/m³	IS 5182 (Part 6): 2006
Carbon Monoxide (CO)	**2.03**	4	mg/m³	CPCB Guidelines, Volume II, 37/2012-13, Page no.16: 2013
Ammonia (NH_3)	**BLQ (LOQ:20)**	400	µg/m³	CPCB Guidelines, Volume I,36/2012-13, Page No.35: 2013
Hydrogen Sulphide (H_2S)	**BLQ (LOQ:6)**	Not specified	µg/m³	IS 5182 (Part VII): 1973

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
TWA : Time Weighted Average
: NAAQS (National Ambient Air Quality Standards (Industrial, Residential, Rural and other Area) specified as: 24 hours TWA in case of Sulphur Dioxide, Nitrogen Dioxide and Ammonia, 1 hour TWA in case of Carbon Monoxide.
Note: Sample ID AA/02/23/0501 bears two Test Reports-AA/02/23/0501 and AA/02/23/0501N

Kavita Shewale
Section In-charge (Chemical)
Reviewed & Authorised by

Ashwamedh Engineers & Consultants
Laboratory Services Division

End of Report

Note:
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3. In case sampling is not done by laboratory, the results apply to the sample as received.
4. There are no additions to, deviations or exclusions from the method.

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387

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AMBIENT AIR QUALITY MONITORING REPORT

Sample ID : AA/02/23/0501	Report No. AA/02/23/0501N	Report Date	01/03/2023
Name and address of Customer	**Ecoman Enviro Solutions Pvt. Ltd.** G - 1002, MSR Queenstown, Chinchwad, Pune - 411033 Maharashtra		
Sampling done by	Laboratory	Sample Description / Type	Ambient Air
Sampling Location	Building Back Side	Date - Sampling	20/02/2023 to 21/02/2023
Sample Quantity / Packing	SO_2, NO_2, H_2S: 30 ml x 6 no. plastic bottle each NH_3: 10 ml x 24 no. plastic bottle CO_2: 1 x 1 no. bladder CO: 1 x 1 no. bladder CH_4: 1 x 1 no. bladder	Date - Receipt of Sample	22/02/2023
Sampling Procedure	As per method reference	Date - Start of Analysis	22/02/2023
Order Reference	Quo. Ref. No. AEC/PN/Q-1051/EESPL dated 21.02.2023	Date - Completion of Analysis	28/02/2023

Meteorological Data / Environmental Conditions

Average Wind Velocity	Wind Direction	Relative Humidity	Temperature	Duration of Survey
3 km/h	N	(Max./Min.): 69/35%	(Max./Min.): 31/15°C	24 h

Parameter	Result	NAAQS# 2009	Unit	Method
Chemical Testing; Group: Atmospheric Pollution				
Carbon Dioxide (CO_2)	**546**	Not specified	ppm	By GC-FID
Methane (CH_4)	**2.11**	Not specified	ppm	By GC-FID

BLQ: Below Limit of Quantification, LOQ: Limit of Quantification
TWA : Time Weighted Average
: NAAQS (National Ambient Air Quality Standards (Industrial, Residential, Rural and other Area) specified as: 24 hours TWA in case of Sulphur Dioxide, Nitrogen Dioxide and Ammonia, 1 hour TWA in case of Carbon Monoxide.
Note: Sample ID AA/02/23/0501 bears two Test Reports-AA/02/23/0501 and AA/02/23/0501N

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4. There are no additions to, deviations or exclusions from the method.

"Practical Testing and Validation of a process and a machine Converting organic waste to compost within 24 hrs. Using thermophilic microbial strains Developed by Greenius Food Recycler Pvt. Ltd., Pune"

Sponsored by:

Greenius
Food Recycler

Greenius Food Recycler Pvt. Ltd.
Talawade, Pune

Executed by:

Council of Scientific and Industrial Research
National Chemical Laboratory

NCIM Resource Center, CSIR-National Chemical Laboratory,

Dr. Homi Bhabha Road, Pune- 411 008, India.

Council of Scientific and Industrial Research
National Chemical Laboratory

सीएसआईआर - राष्ट्रीय रासायनिक प्रयोगशाला
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Project/Study related information

Title: "Practical Testing and Validation of a process and a machine Converting organic waste to compost within 24 hrs, using thermophilic microbial strains developed by Greenius Food Recycler Pvt. Ltd., Pune"

Sponsor: Greenius Food Recycler Pvt. Ltd., Pune, India

Executed by: NCIM Resource Centre, CSIR-NCL, Pune, India

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Experiments started on: 20th October, 2020

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Report finalized on: 24th December, 2020

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List of Abbreviations Used

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1	Greenius Food Recycler Pvt. Ltd	Greenius
2	Organic Waste Composting Machine	OWC Machine
3	Greenius' Organic Waste Composting Machine	GOWCM
4	Solid Waste Management rules	SWM
5	Fertilizer Control Order	FCO
6	Organic Solid Waste	OSW
7	Sodium Bicarbonate	SBC
8	Ammonium Bicarbonate	ABC
9	Calcium Carbonate	CCB
10	Sodium Hydroxide	NaOH
11	Average Organic Municipal Solid Waste	AOMSW
12	Cooked Hotel Waste	CHW
13	Cooked Canteen Waste	CCW
14	Cooked waste	CW
15	Raw Vegetable Waste	RVW
16	Raw Fruit Waste	RFW
17	Raw Garden waste	RGW
18	Raw Chicken and Mutton Waste	RCM
19	Raw Sea Food waste	RSFW
20	Crushed Vegetable Market Waste	C&MW
21	Crushed Vegetable Waste	CrVW
22	Crushed Fruit Waste	CrFW
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24	Household Waste	HHW

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1.0 Introduction

The municipal solid waste (MSW) management is a complex issue for municipal corporations but essential and important with respect to public health, environment, and the quality of life of the citizens. The issue of MSW management is becoming sensitive due to various factors such as increase in population, developmental activities, and changes in socio-economic scenario, and improved standard of living etc. The rate of MSW generation is an index of socio-economic development and economic prosperity of the region. Increasing industrialization and rising income levels lead to greater use of resources which further leads to the increased MSW generation and more complex composition of MSW than earlier. Thus, waste quantities as well as composition are inextricably linked to the vibrancy of economic activity and resource consumption pattern of the society which generates the waste.

The Municipal Solid waste consists of Organic Waste (Wet waste) and Inorganic waste (Dry waste). Many initiatives have been taken by the municipal authorities for MSW management which still awaits further improvements and technological updating owing to huge quantum of waste coupled with its changing characteristics. **Composting** is an aerobic method (it requires the presence of oxygen) of decomposing organic solid waste. It can be used to recycle organic material. The **process** involves decomposition of organic material into a humus-like material, known as **compost**, which is a good fertilizer for plants. Composting is a great way to reduce food waste and contributions to greenhouse gas emissions. Compost is organic material that can be added to soil in order to help plants to grow.

Benefits of Composting

- Enriches soil, helping retain moisture and suppress plant diseases and pests.
- Reduces the need for chemical fertilizers.
- Encourages the production of beneficial bacteria and fungi that break down organic matter to create humus, a rich nutrient-filled material.
- Reduces methane emissions from landfills and lowers your carbon footprint.

Greenius' Organic Waste composting machine produces quality compost with improved C/N ratio thereby reducing the expenditure on purchase of fertilizers and pesticide

'Greenius Food Recycler Pvt. Ltd' provides organic waste management solutions for a variety of domestic, commercial and industrial use, from restaurants, housing societies up to large-scale institutions and municipal corporations. Utilizing unique microbial technology and cutting edge engineering applications, their composting machines reduce waste volume up to 90% and produce nutrient-rich compost which goes back to farms. Thus, by deploying organic waste composting machines, waste is converted to resource and organic farming can be accelerated.Further, the technologies to be adopted for MSW management and processing predominantly depend upon MSW quantity, quality and range of variations thereof. Composting is the most widely used technology for organic waste management in India and in many other countries. Conventional way of composting takes 4-6 months for complete decomposition of the agricultural residues, whereas Greenius'- fastens the process to reduce the time up to 3-6 weeks. This makes the process attractive and cost-effective.

2.0 Objectives and Scope of the Study

2.1 Objectives

The objectives of the present study were to identify the microbes, validate the composting process, Test and evaluate the Organic Waste Composting Machine, test the compost output of all the models and evaluate compost output developed by the Greenius' Food Recycler Pvt. Ltd, Pune.

2.2 Scope of Work

- The sampling and analysis shall be carried out for all the machines processing different types of the waste such as food waste, garden biomass, cooked hotel waste, Average Organic Municipal Solid Waste and/ or combination thereof. All work will be performed under the supervision/guidance of NCL scientists & the company. All the experimentation required for validation of the process will be done at company's office & factory.
- Testing of Greenius' Organic Waste Composting Machine (2kg/day) using various types of Organic waste and pH stabilizers like Sodium Hydroxide, Sodium Bicarbonate, Ammonium Bicarbonate, Calcium Carbonate, etc.
- Finalization of pH stabilizer, its dosage and the frequency of its addition for each model of Greenius' Organic Waste Composting Machine.
- Testing of Pathogens in Average Organic Solid Waste from Garbage in Various Homes Composting of following organic waste materials (crushed as well as non-crushed) will be studied:
- Average Organic Municipal Solid Waste mixture from Housing Society,
- Cooked Hotel Waste, Cooked Industry Canteen Waste
- Raw fruit waste
- Raw vegetable waste
- Raw non-veg waste (chicken, fish, mutton, shell fish and eggs and pork and beef)
- Cooked food waste which includes mixed vegetables, mixed non-veg, chicken, eggs, fish, shells, etc.
- Garden waste including green& dried brown leaves separately
- Garden waste along with food waste

- Evaluation of parameters of compost as per Solid Waste Management (SWM) Rules, 2016 and Fertilizer Control Order FCO standards, 2009 to find out its suitability as a fertilizer.
- Identification and authentication of the four microbial cultures developed in company's laboratory by 16S rRNA gene sequencing.
- Testing of Output Air Quality from Exhaust of various models of Organic Waste Composting Machines of Greenius Food Recycler Pvt. Ltd.
- Testing of Output Water Quality from Exhaust of various models of Organic Waste Composting Machines of Greenius Food Recycler Pvt. Ltd.
- Validation of a process of converting organic waste material to compost by microbial cultures at 55-60^{O}C within 24 hr. using a machine developed by the company.

2.3 About the Manufacturer

Greenius Food Recycler Pvt. Ltd is a leading company in the field of manufacturing of composting equipment's. Since its establishment, Greenius Food Recycler has been making great contribution in the development of decentralized solid waste management. Greenius Food Recycler provides organic waste management solutions for a variety of commercial and industrial use, from restaurants, housing societies up to large-scale institutions and municipal corporations.

Greenius' Organic Waste Composting Machine is a unique "MADE FOR INDIA" and "MADE IN INDIA" solution, to solve garbage problems effectively.

Greenius Food Recycler Pvt. Ltd. has its registered office at MSR QUEENS TOWN ,FLAT NO. G-1002, WING-G, SURVEY NO. 3876, UDYOG NAGAR CHINCHWAD, PUNE, Maharashtra, India, 411033 and Head office at Gat No. 189, Behind Jyotiba Temple, Jyotiba Nagar, Bhalekar Chowk, Talawade, Pune, Maharashtra 412114

For carrying out efficient composting with excellent manure value scientifically designed processes and machines are required. M/s Greenius Food Recycler Pvt. Pune has developed a composting process and a composting machine which processes the organic waste into compost within 24 hours. However, it is mandatory to check the quality of the

compost as per Solid Waste Management Rules, 2016 and Fertilizer Control Order standards, 2009 and its applicability to the agriculture farms as a fertilizer.

Therefore, M/s Greenius Food Recycler Pvt. Ltd, Pune approached NCL to study/validate the process and to carry out the performance evaluation of the composting machine so as to find out the efficacy of the machine to process the waste and to find out the quality of the compost produced from the waste as per Solid Waste Management Rules, 2016 and Fertilizer Control Order standards, 2009.

3.0 Technical Details

3.1 Design Details of Greenius' Organic Waste Composting Machine

The composting process developed by Greenius is a combination of Bio-Technology and Engineering. It is completely natural and biological and it is done by in-vessel composting wherein perfect mixing, heating and ventilation cycle is achieved. This perfect mixing, heating and ventilation is achieved by PLC, mixing blades, exhaust system, smart sensors and Controllers and its proprietary Software Program. This can be achieved by applying good engineering concepts and design.

Machine is compact in size and most favourable conditions required for the mixed culture of Thermophillic bacteria is maintained in the machine. The Thermophillic bacteria used in the machine are produced in own Laboratory of Greenius. These Thermophilic bacteria are useful to break down and decompose all kinds of organic waste into compost within 24 hrs with volume reduction of 85-90 %. Perfect compost is produced when a good input organic waste is put into the machine. As no chemical is used, it is completely natural.

Composting machine consists of rotating blades which is connected to the shaft and its only purpose is mixing. Blades rotate at 2 rpm (2 revolutions per minute). As there is no crushing or grinding process involved, the machine is completely noiseless. When Organic Waste is added to the machine, moisture is sensed by the humidity sensor, due to which heater turns ON and the composting tank gets heated. Due to this, the excess water content in the organic waste is evaporated and passed away in the form of water vapour through the exhaust system. As any organic waste contains 70-80% water content, 70-80% volume reduction is achieved at this stage itself. At the same time thermophillic microorganisms decompose the remaining organic waste into compost within 24 hours, with a total volume reduction of 85-90%.

Figure 1: Time wise Development in the Composting Process with the Sectional View of the Greenius' Organic Waste Composting Machine

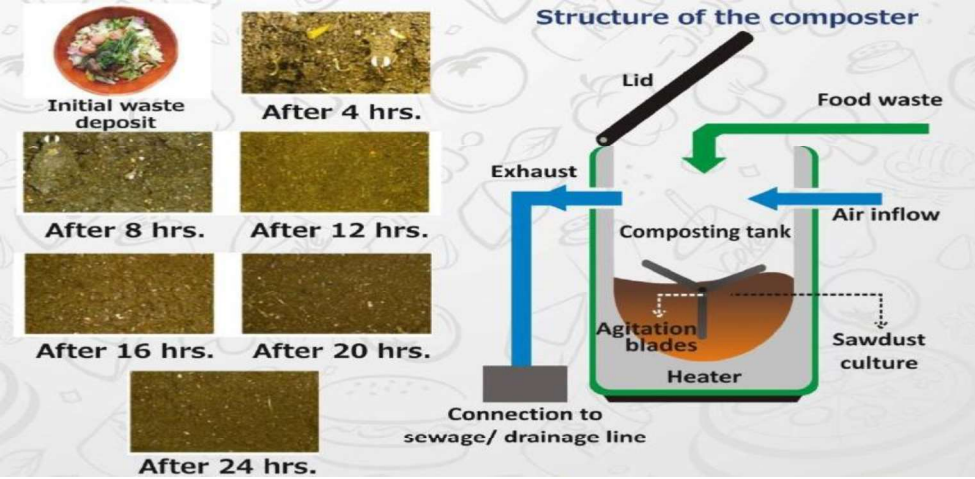


Figure 2 : Work Flow diagram of the Greenius' Organic Waste Composting Machine

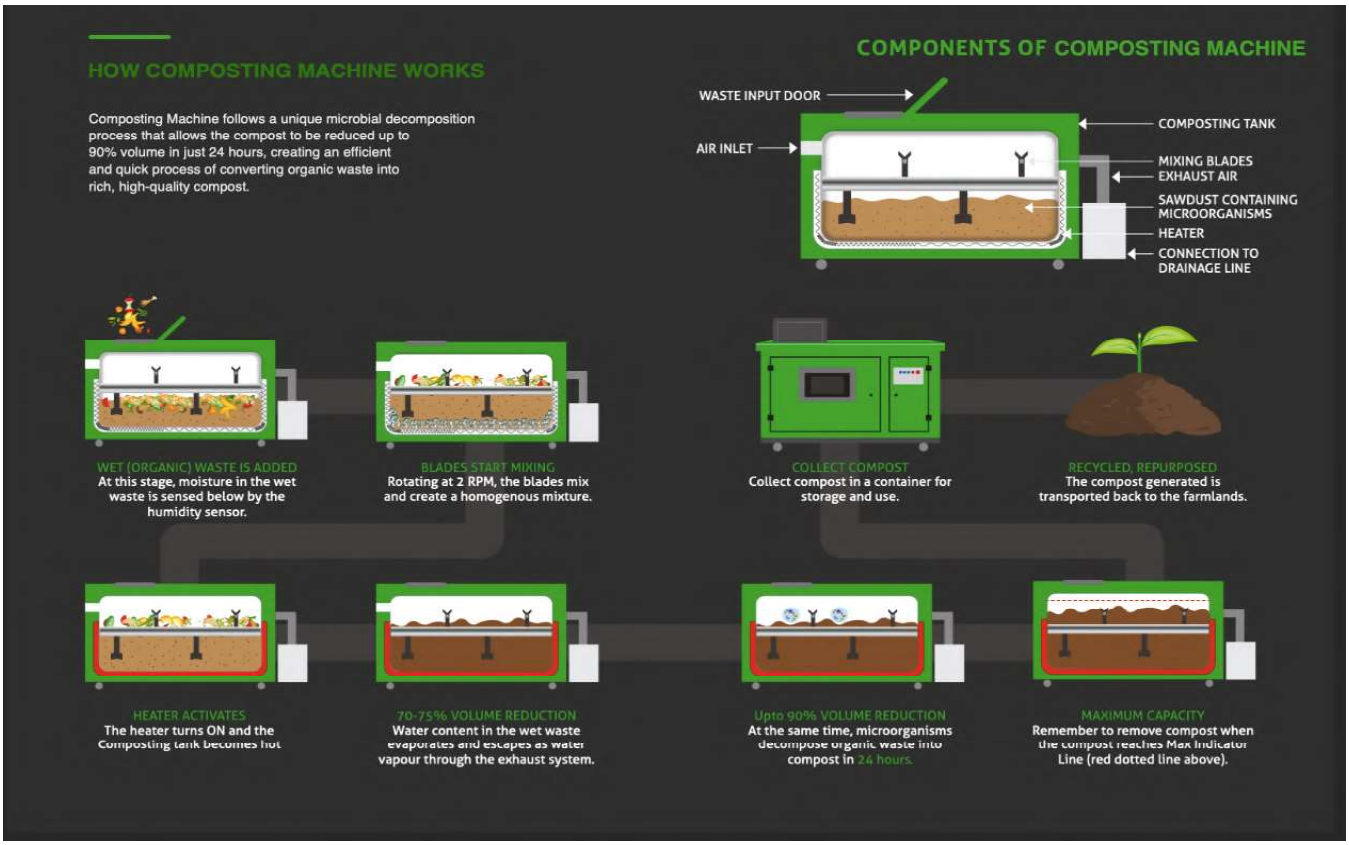


Figure 3: Descriptive Image of Compostable and Non-Compostable Material in Greenius' Organic Waste Composting Machine

3.2 Preparation of Inoculum for Composting Machine

For decomposing the organic waste into compost, micro-organisms play the main role. Currently Greenius Food Recycler Pvt. Ltd. has developed a consortium of 4 different bacterial cultures for its machine Greenius' Organic Waste Composting Machine for rapid composting using thermophilic process. Following microbial cultures are present in the consortium:

[redacted]

[redacted]

[redacted]

[redacted]

Following protocol has been developed by Greenius for preparation of Inoculum:

1. Preparation and sterilization of media

Medium used: Basal salt medium

a) Mix all the ingredients given in the table 1 thoroughly as per the given quantity
b) Check the pH of medium and adjust to 7.5 using 0.1 N NaOH or 0.1 N HCL
c) Keep the Flask in Autoclave for sterilization
d) Autoclave the Media at 121 ˚C for 20 minutes at 15 psi

2. Inoculation of bacterial culture into the sterile media

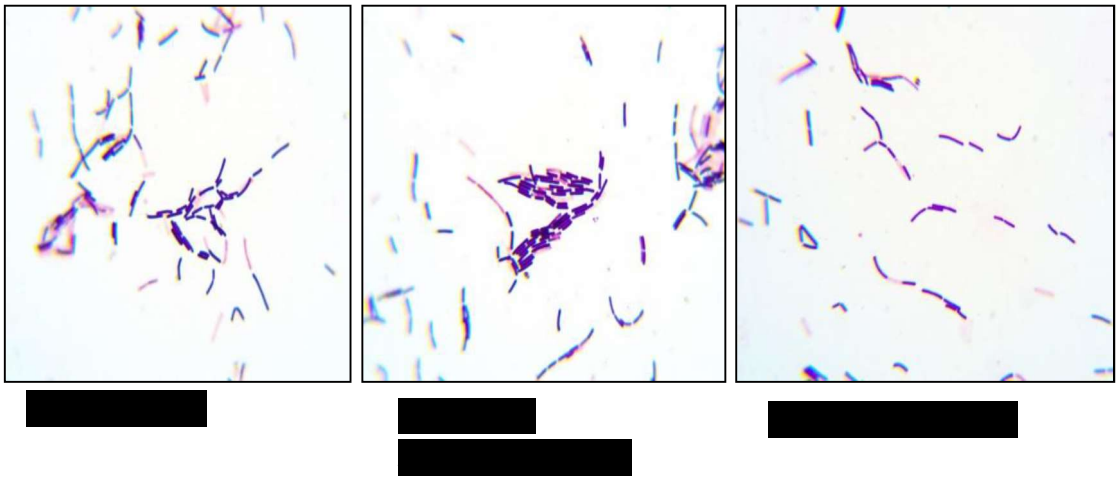
a) Each individual Bacterial isolate were separately grown in a flask in 250 ml of Nutrient broth and kept at 55 ˚C for 24 hours at 120 rpm in shaker Incubator
b) 50 ml of above previously grown individual bacterial isolate were inoculated into the flask containing 3-liter Basal salt medium.
c) Inoculations of bacterial culture were performed in the laminar air flow under aseptic condition.
d) Further, the flasks were kept at 55 ˚C for 24 hours at 120 rpm in shaker Incubator.
After 24 hours growth of bacterial culture was observed in terms of turbidity.

Table 1: Media Composition

Sr. No.	Media Ingredients	Concentration (g/L)
1	Potassium dihydrogen phosphate (KH_2PO_4)	0.6
2	Magnesium sulphate ($MgSO_4$)	0.5
3	Ammonium Sulphate (NH_4SO_4)	1.3
4	Calcium Chloride ($CaCl_2$)	0.25
5	Iron chloride anhydrous	0.1
6	Dextrose	1
7	Yeast extract	1
8	pH	7.0

Autoclave the media at 121 ^{0}C for 20 minutes before use.

Figure 4: Gram Staining Images of Isolates under Compound Microscope



3.3 Identification of isolates by 16S rRNA gene sequencing

- DNA Isolation and PCR amplification.
- Genomic DNA extraction was carried out by HiPurA DNA extraction kit (Hi Media) using manufacturer's protocol.
- Agarose gel electrophoresis was done to confirm the presence of DNA and concentration of template to be used for PCR amplification was calculated.
- DNA was amplified using universal eubacterial primers 27F and 1492R and sequenced onto 3530xl DNA genetic analyser (Applied Biosystems).

16S rRNA gene sequencing was carried out to identify the isolates to their closest phylogenetic neighbour using BLASTn (ncbi.nlm.nih.gov server for type strain option).

Table 2: Sequence similarity search results

Strain Designation	Closest phylogenetic affiliation	Max. Similarity (%)
[redacted]	[redacted]	99
[redacted]	[redacted]	99
[redacted]	[redacted]	99
[redacted]	[redacted]	100

3.4 Various Models Of Greenius' Organic Waste Composting Machine

Various models of Greenius'- Organic Waste Composting Machine are available like F-02, F-25, F-75, F-125, F-250, F-500, F- 700 and F – 1250. The only changes in these models are the size as per the processing capacity and power consumption. The working principal of all the above-mentioned models are same as discussed earlier.

Table 3: Technical Details Range of Greenius' Organic Waste Composting machine

Model	Processing Capacity	Power Supply	Dimensions (lx b x h) ft	Power Rating
F - 02	2 kg/day	Single Phase	1.75x 0.77x1.90	89W
F – 25	25-30 kg/day	3 Phase	5x 2.5x3.5	1.5 kW
F – 75	75-85 kg/day	3 Phase	6.5x3.5x5	3.5 kW
F – 125	100-140 kg/day	3 Phase	7x4x5	5.5 kW
F – 250	200-300 kg/day	3 Phase	8.5x4.5x6	11 kW
F – 500	400-550 kg/day	3 Phase	12x6.5x7	16.3 kW
F – 700	600-800 kg/day	3 Phase	13.5x7x8	27.5 kW
F – 1250	1250-1500 kg/day	3 Phase	16x7.5x9	41 kW

Figure 5: Range of Greenius'- Organic Waste Composting Machine

Model : F - 25	
Per day waste processing capacity	25 Kg
Power Supply	Three Phase
Approx Dimensions	5 x 2.5 x 3.5
Power rating	1.5 Kw

Model : F - 75	
75 Kg	Per day waste processing capacity
Three Phase	Power Supply
6.5 x 3.5 x 5	Approx Dimensions
3.5 Kw	Power rating

Model : F - 125	
Per day waste processing capacity	125 Kg
Power Supply	Three Phase
Approx Dimensions	7 x 4 x 5
Power rating	5.5 Kw

Model : F - 250	
Per day waste processing capacity	250 Kg
Power Supply	Three Phase
Approx Dimensions	8.5 x 4.5 x 6
Power rating	11 Kw

Model : F - 500	
500 Kg	Per day waste processing capacity
Three Phase	Power Supply
12 x 6.5 x 7	Approx Dimensions
16.3 Kw	Power rating

Model : F - 700	
Per day waste processing capacity	700 Kg
Power Supply	Three Phase
Approx Dimensions	13.5 x 7 x 8
Power rating	27.5 Kw

Model : F - 1250	
1250 Kg	Per day waste processing capacity
Three Phase	Power Supply
16 x 7.5 x 9	Approx Dimensions
41 Kw	Power rating

3.5 Requirements and Procedure for Operating the Machine

Greenius'- organic waste composting machine is fully automatic and does not require any special operator or trained personnel. The only work is to add organic waste and close the door. Just dump the waste and forget it. Following are the steps for the operation of machine:

1. Requirements before Operation:

- Segregation of Waste: Before adding the garbage, it should be segregated properly. Do not add hard or inorganic material as shown in Exhibit 3.
- Please remove excess water by gravity in the kitchen or wasting area. This can be done by making holes in the garbage bin & keeping in wasting area to drain excess water by gravity for 1 hr.

2. Starting the Machine for the First Time:

- Make sure that the power supply of the machine and Exhaust pipe is connected properly.
- The supply voltage should be balance in all the three phase (400 V – 440 V).
- Ensure that the neutral & earthing connection should be connected properly.
- Turn on the MCB. Check the SPP relay if it shows phase reverse (i.e. The SPP LED blinks) turn off the MCB and change any one of the phase sequence if it is R Y B then change it to R B Y.

3. Procedure to Operate the Machine

- Open the Top Door (Waste input door) to add the segregated organic waste, saw dust and bio culture as per the prescribed capacity of purchased machine.
- Close the top door properly after adding the material
- Ensure that machine should be in "AUTO" mode. For normal working and operation of machine it has to be always in auto mode.
- If it is in manual mode it will not function. Manual mode is only for removing the compost. IF MACHINE IS FOUND TO BE IN MANUAL MODE CHANGE TO AUTO MODE.
- Turn ON the MCB then release the emergency stop button.

- The machine will show power on indicator on the Display screen.
- If the top door is open pop up message will be displayed in the main screen indicating that the top door is open. At that time the motor, heater and blower will be turned off.
- Therefore, ensure that the door is properly closed.
- The motor, Heater & Blower will Turn On simultaneously and functions as per the program in the PLC.

4. Compost Removal Method

- When the compost level reaches the mark inside composting tank, change the mode from auto to manual.
- Open the compost removal door to remove the compost
- Remove the compost only till shaft level. It is necessary to maintain this level for effective composting of future compost.
- Collect the compost in a bag or bin. The compost is ready to use for your plants.
- After removing the compost please change mode from manual to auto and close the compost door.

Figure 6: Flowchart for Operation of the machine

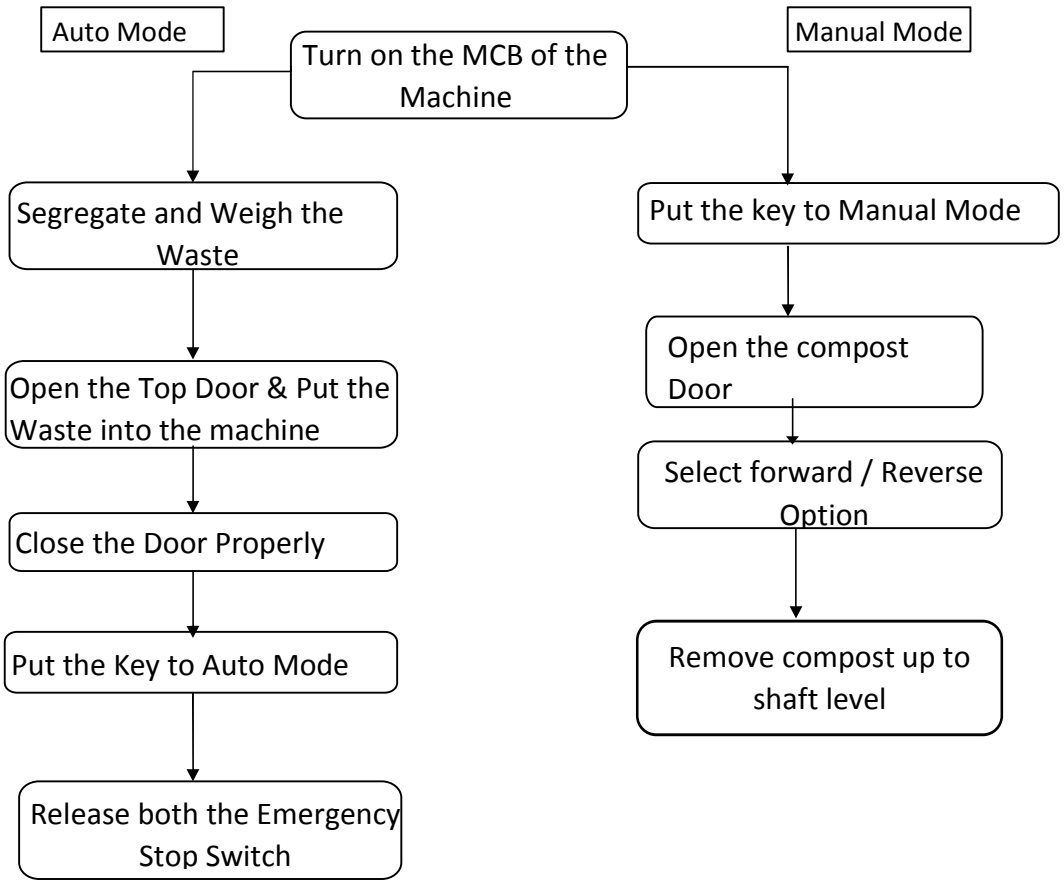


Figure 7: Description of the Various Parts of the Composting Machine

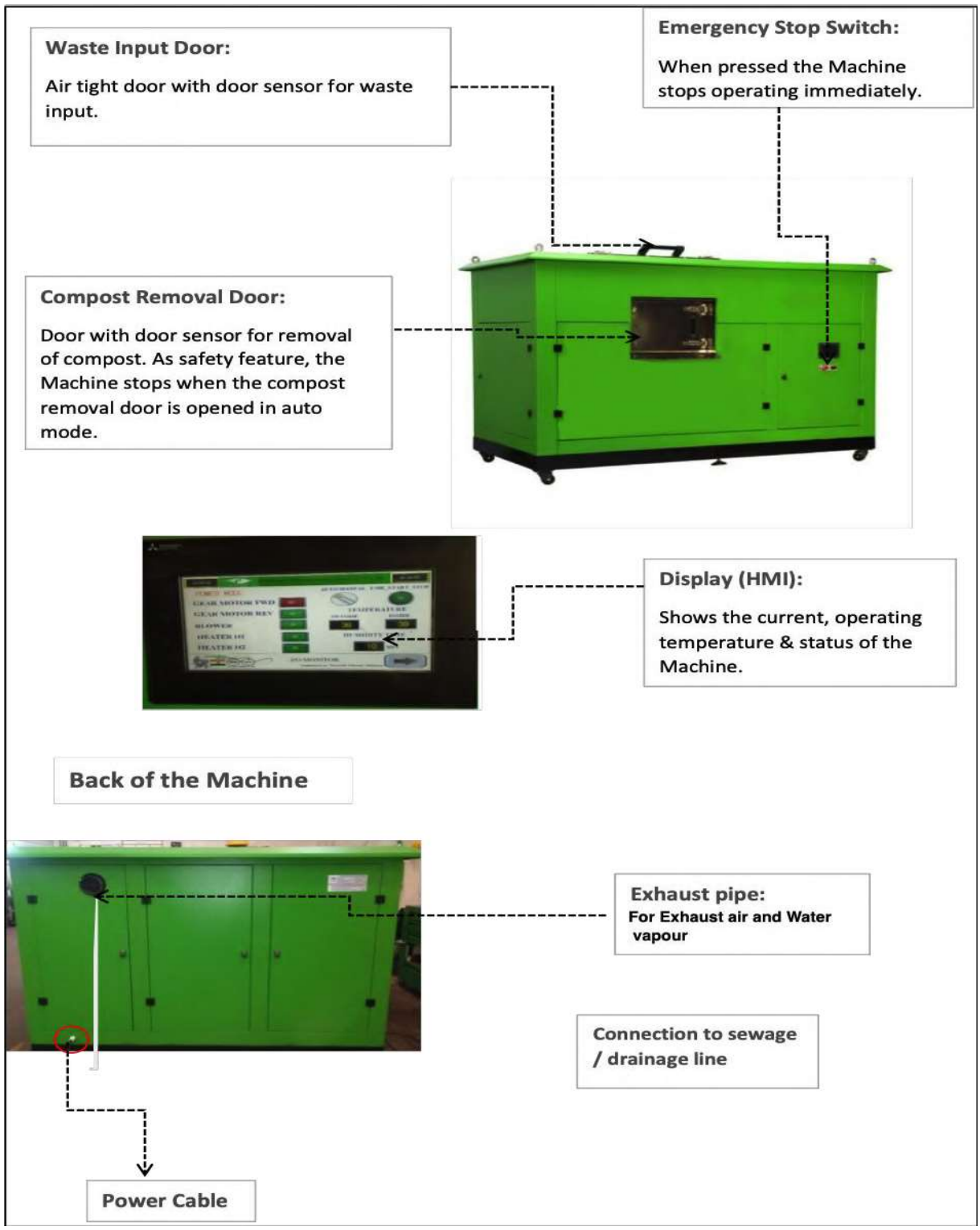
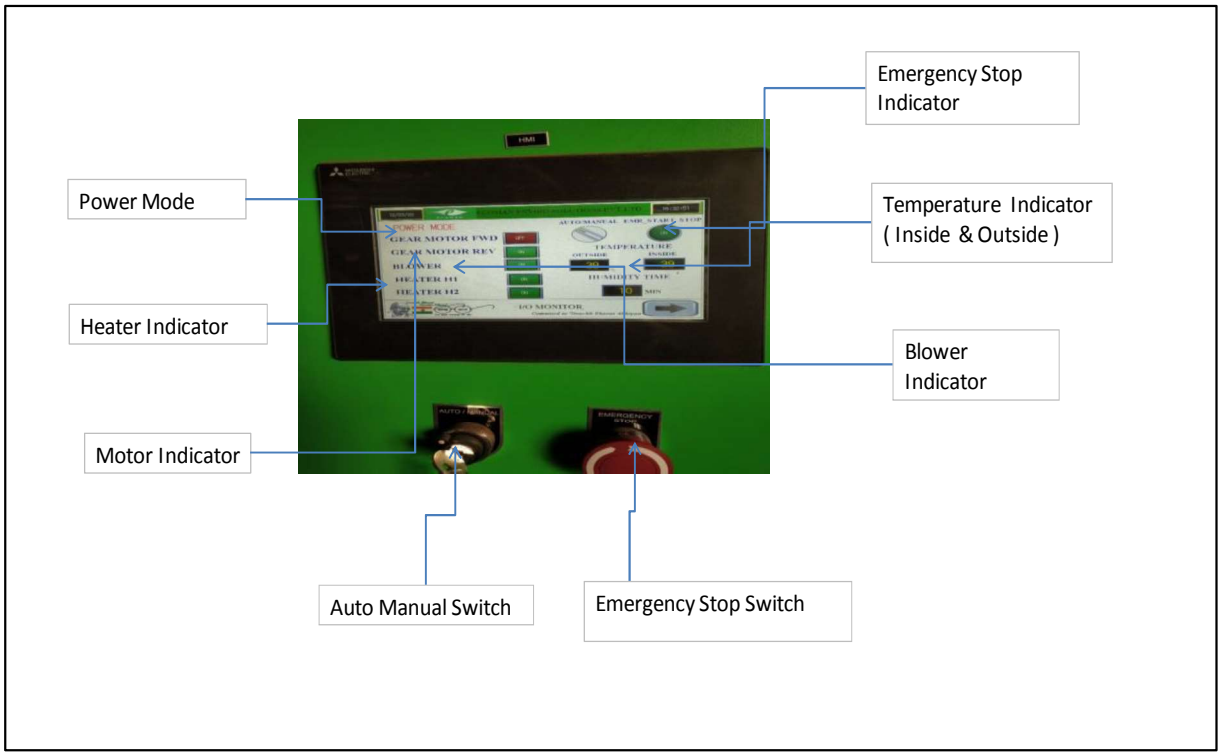


Figure 8: Description of Display Panel Greenius' Organic Waste Composting Machine



3.6 Commissioning of Machine

After installation follow this procedure for effective performance of the machine.

For 1st Week - Add only 25% organic waste of the machine capacity

For 2nd Week - Add only 50% organic waste of the machine capacity

For 3rd Week - Add only 75% organic waste of the machine capacity

For 4th Week - Add 100% organic waste of the machine capacity

After 4th Week - Add organic waste as per the machine's capacity

Note: Do not remove all compost even when you need to clean the machine

4.0 Performance Evaluation of machine and composting at factory site

4.1 Testing of Greenius'- Organic Waste Composting Machine (2kg/day) using various types of Organic Solid Wastes and 4 different pH stabilizers; Sodium Hydroxide, Sodium Bicarbonate, Ammonium Bicarbonate and Calcium Carbonate

Experimental Plan:

- In order to validate the Composting Process, experiments were performed and tested by the GOWC Machine of 2kg/per day processing capacity using microbial consortia (consisting of [redacted] various types of organic solid waste samples and pH stabilizer.
- Following are the different pH stabilizers and various types of OSW samples used in the experiment and tested by the GOWCM:

1. Average Organic Municipal Solid Waste sample (AOMSW) + Sodium Hydroxide (NaOH) as pH stabilizer
2. Cooked Hotel Waste sample (CHW) + Sodium Bicarbonate (SBC) as pH stabilizer
3. Cooked Canteen Waste sample (CCW) + Ammonium Bicarbonate (ABC) as pH stabilizer
4. Average Organic Temple Waste sample (AOTW)+ Calcium carbonate (CCB) as pH stabilizer

- For each experiment 2 Kg of various OSW samples like AOMSW, CHW, CCW, AOTW and sawdust was added separately into the machine (sawdust was added as carrier medium for Inoculum).
- pH of the organic solid waste samples AOMSW, CHW, CCW, AOTW and saw dust was measured separately and it was found to be acidic (3.5). Therefore, for each experiment initial pH of the organic solid waste samples and saw dust was adjusted to 7.5 by adding different pH stabilizers like NaOH, SBC, ABC, and CCB separately. Then 320 ml of Inoculum was added into the machine containing saw dust.
- Each experiment was monitored for the period of 7 days. During that period organic solid waste samples of AOMSW, CHW, CCW, AOTW was added every day into the machine and after every 24 hours various parameters like pH, EC, temperature, appearance of compost etc. was monitored. The pH stabiliser was not added if the pH of compost didn't drop. When the pH of compost dropped below 6.5, after adding

the organic solid waste then only pH stabilizer like NaOH, SBC, ABC, and CCB was used and added into the GOWCM until pH measurement reached till 7.5.

- Compost samples were collected after every 24 hrs and were kept for maturing at room temperature. A random sample of compost after every 24 hrs was sent to NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) to check the quality of compost as per SWM rules, 2016 and FCO standards, 2009.
- Also, a random sample of mature compost of different waste types after 15, 30, 60, 90 days were also sent to NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) to check the quality of compost as per SWM rules, 2016 and FCO standards, 2009.

4.2 Finalization of pH stabilizer, its dosage and frequency for each model of Greenius' Organic Waste Composting Machine

1. Various pH stabilizers like Sodium hydroxide, Sodium Bicarbonate, Ammonium Bicarbonate, Calcium Carbonate were used to adjust the pH of the machine to 7.5 before or after adding Food waste.
2. During the composting process, bacteria produce enzymes which cause conversion of Organic Waste into compost in 24 hrs. Compost was brown in colour and was Free from of any foul smell. It can be firmly concluded and confirmed that GOWC Machine converts AOMSW, CHW,CCW, AOTW into Compost within 24 hours and the results of Compost sample tested from NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) as per (report no., 1 to 5), confirms that all the physical, chemical and elemental parameters of the compost produced from various Organic Waste is acceptable as per SWM rules, 2016 and FCO standards, 2009.
3. As the pH of compost (stabilized by adding sodium bicarbonate/ SBC powder) remained near neutral for 6 days, even after daily addition of Organic waste. Therefore pH stabilizer SBC is ideal and required to be added once in a 6-7 days (depending upon season or type of waste) in GOWC specifically for maintaining pH and electrical conductivity of output compost within permissible limits. For all other parameters of compost to be within range, no additives or stabilizers are required to be added in GOWC Machine.
4. From the below table (Table 4) it can be seen that Sodium Bicarbonate is found to be the most suitable pH stabilizer that can be used for maintaining the pH of the compost near neutral range**.**

Table 4: Summary of the pH stabilizer used for adjusting the pH of Food waste

Sr. No	pH stabilizer used	Initial pH of the machine after adding food waste & pH stabilizer	Amount of Stabilizer (grams) require to adjust the pH of 2 Kg Food waste	Addition of pH stabilizer (1-2 hr before adding new waste)	pH of the compost (after 7 days)
1	Sodium Hydroxide	7.5	30 grams	After every 24 hours	6.5
2	Sodium Bicarbonate	7.5	150 - 200 grams	After every 5 days	6.9
3	Sodium Bicarbonate	7.5	200- 250 grams	After 7 days	7.2
4	Ammonium Bicarbonate	7.5	130 grams	Every 2 days	6
5	Calcium Carbonate	7.5	700 to 900 grams	Every 2 days	6.3

- **Dosage of pH stabilizer Sodium Bicarbonate for each model of Greenius' Organic Waste Composting Machine is calculated based upon following two factors:-**

1. Lower the capacity of machine, less amount of SBC will be required, while higher the capacity of machine high amount of SBC will be required for adjusting the pH to 7.5. Quantity of SBC differs for different models (Table 5)

Table 5: Dosage of pH stabilizer SBC for Greenius' OWC machine

Dosage of pH stabilizer SBC for Various Machine Models of GOWC					
Greenius' OWC Machine Model	Greenius' OWC machine per day processing capacity	Amount of SBC (in Kg) required to Increase the pH from 3.5 to 7.5	Amount of SBC (in Kg)required to Increase the pH from 4.5 to 7.5	Amount of SBC (in Kg) required to Increase the pH from 5.5 to 7.5	Amount of SBC (in Kg) required to Increase the pH from 6.5 to 7.5
F-02	2 Kg	0.2	0.15	0.1	0.05
F-25	25 Kg	2.5	1.875	1.25	0.625
F-75	75 Kg	7.5	5.625	3.75	1.875
F-125	125 Kg	12.5	9.375	6.25	3.125
F-250	250 Kg	25	18.75	12.5	6.25
F-500	500 Kg	50	37.5	25	12.5
F-700	700 Kg	75	56.25	37.5	18.75
F-1250	1250 Kg	125	93.75	62.5	31.25

2. As the pH of compost remains neutral for 6-7 days even after daily addition of all the eleven type of waste (AOMSW, CCW, CHW, RVMW, RFW, RGW, Raw Chicken and Mutton waste, RSFW, Cr VMW, Cr FW, and Cr GW) for all the eight machine models (F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250) of GOWC Machine, therefore Frequency of pH stabilizer (SBC) to be added is once in 6-7 days, for maintaining pH of the Compost .

If the end user /customer does not add pH stabilizer SBC, then all the parameters of compost produced by GOWC machine, as per SWM rules, 2016 and FCO standards, 2009 will still be within the range except for pH and EC. The compost in this case can be used by diluting it with soil or after maturing it for 15-30 days in aerated room in bags.

Table 6: Normalisation of Compost pH by Different Alkali Solutions

Machine Model No	Ammonium Bicarbonate (4%) for 10 g			
	pH	**Upto pH**	**Quantity Required (ml)**	**$(NH4)HCO_3$ gm/ 10 gm**
F 25	6.57	7.45	14.1	0.564
F 125	6.39	7.42	6.7	0.268
F 700	6.49	7.48	8.3	0.332
	Sodium Bicarbonate (5%)			
	for 10 g			
	pH	**Upto pH**	**Quantity Required (ml)**	**$NaHCO_3$ gm/ 10 gm**
F 25	6.55	7.5	6.1	0.305
F 125	6.35	7.5	12.9	0.645
F 700	6.34	7.52	12.6	0.63
	NaOH (1%)			
	For 10g			
	pH	**Upto pH**	**Quantity Required (ml)**	**NaOH gm/ 10 gm**
F 25	6.55	7.5	3.4	0.034
F 125	6.35	7.52	5.3	0.053
F 700	6.35	7.51	6.1	0.061

4.3 Testing of Pathogens in Average Organic Solid Waste from Garbage in Various Homes

Experimental Plan:

- An experiment was performed to investigate the presence of pathogens in Average Organic Solid waste (AOSW) from Garbage in various Homes
- A total of 10 AOSW samples (segregated samples) were collected from garbage of different homes.
- Samples were collected in clean and sterile zip lock bag and stored at 4°C for further analysis.
- Collected AOSW Sample were analysed at NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) to check the presence of various pathogens like *E.coli, Salmonella, Coliform*, *Shigella, Streptococci* from Garbage in various Homes.

- **Results**: As per the reports (report no., 6 to 15) from NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) all the 10 AOSW samples tested positive for the presence of pathogen coliform, while 5 AOWC samples also tested positive for pathogen *Salmonella*. Pathogens like *E.coli, Shigella*, and *Streptococci* were found to be negative for all the 10 AOSW samples.

- **Conclusion**: From the report of NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) it can be firmly concluded that there are harmful pathogenic bacteria present in the Organic Waste in our garbage bin inside our kitchen/homes dustbin. This makes the kitchen relatively unhygienic and relatively unhealthy.
- As these bacteria's and viruses cause diseases in humans, the Organic Waste inside all kitchens / homes needs to be disposed off properly and carefully, otherwise they would cause illness if they come in contact with humans or various equipment and utensils which we use in our everyday life.

- Greenius' Organic Waste Composting Machine seems to be a scientific and apt solution to process & dispose of Organic Waste in hygienic and healthy manner.

4.4 Testing of Various Types of Organic Waste in different models of Organic Waste Composting Machines of Greenius Food Recycler Pvt. Ltd

Experimental Plan

- In order to validate the Composting Process, experiments were carried out using all eight models (F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250) of the GOWC Machine with microbial consortia (consisting of [redacted]) various types of organic solid waste and using Sodium Bicarbonate as pH stabilizer. The eight models of GOWC Machine have per day organic waste processing capacity as, F-02 (2kg/day), F-25 (25-30kg/day), F-75 (75-85kg/day), F-125 (125-150kg/day), F-250 (250-300kg/day), F-500 (500-600kg/day), F-700 (700-850kg/day) F-1250 (1250-1500kg/day) depending on the type of waste.
- Following are the 11 types of OSW waste used in the experiment for testing of the GOWCM (Table 7). All the following 11 type of waste were tested with all the 8 machine models.

Table 7: List of Various type of Organic Waste tested in GOWC machine models

Sr.no	Waste tested in various models of GOWC	Abbreviations used	Machine Models Tested
1	Average Organic Municipal Solid Waste (House hold waste)	AOMSW	F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250
2	Cooked Canteen waste	CCW	F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250
3	Cooked Hotel Waste	CHW	F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250
4	Raw Vegetable Market Waste	RVMW	F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250
5	Raw Fruit Waste	RFW	F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250
6	Raw Garden waste GW	RGW	F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250
7	Raw Chicken and Mutton Waste	RCM	F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250
8	Raw Sea Food waste	RSFW	F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250
9	Crushed Vegetable Market Waste	CrVMW	F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250
10	Crushed Fruit Waste	CrFW	F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250
11	Crushed Garden waste GW	CrGW	F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250

- For the GOWC machine, Sawdust is used as the carrier medium for Inoculum. While supplying the machine to the customer Greenius supplies it with microbial consortia sprayed on sawdust.
- For each experiment all the eleven types of waste AOMSW, CCW, CHW, RVMW, RFW, RGW, RCM, RSFW, CrVMW, CrFW, CrGW was added into the eight different models

(F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250) of GOWC machine according to their capacity (Table 8).

- Initial pH of the Starter mixture consisting of different organic solid waste (AOMSW, CCW, CHW, RVMW, RFW, RGW, RCM waste, RSFW, CrVMW, CrFW, and CrGW), saw dust and compost was measured separately and it was found to be slightly acidic (4.5 to 5.5). Therefore, for each experiment initial pH of the Starter mixture was adjusted to 7.5 by adding pH stabilizer SBC separately. Then required volume of Inoculum was added into the various machine models containing the waste (Table 8).

Table 8: Quantity of Organic waste, SBC, and Culture for various GOWC Machine Models

Sr. No	GOWC Machine Models	Waste Capacity (Kg)	Amount of pH stabilizer SBC (Kg)added to adjust the pH to 7.5	Culture Added (liters)	Type of Waste tested
1	F-02	2	0.2	0.32	AOMSW, CCW, CHW, RVMW, RFW, RGW, RCM, RSFW, CrVMW, CrFW, CrGW
2	F-25	25	1.5	4	AOMSW, CCW, CHW, RVMW, RFW, RGW, RCM, RSFW, CrVMW, CrFW, CrGW
3	F-75	75	6	6	AOMSW, CCW, CHW, RVMW, RFW, RGW, RCM, RSFW, CrVMW, CrFW, CrGW
4	F-125	125	10	9	AOMSW, CCW, CHW, RVMW, RFW, RGW, RCM, RSFW, CrVMW, CrFW, CrGW
5	F-250	250	18	12	AOMSW, CCW, CHW, RVMW, RFW, RGW, RCM, RSFW, CrVMW, CrFW, CrGW
6	F-500	500	25	18	AOMSW, CCW, CHW, RVMW, RFW, RGW, RCM, RSFW, CrVMW, CrFW, CrGW
7	F-700	700	35	24	AOMSW, CCW, CHW, RVMW, RFW, RGW, RCM, RSFW, CrVMW, CrFW, CrGW
8	F-1250	1250	65	30	AOMSW, CCW, CHW, RVMW, RFW, RGW, RCM, RSFW, CrVMW, CrFW, CrGW

- Each experiment was monitored for the period of 7 days. During that period organic solid waste samples AOMSW, CCW, CHW, RVMW, RFW, RGW, RCM, RSFW, CrVMW, CrFW, CrGW was added every day separately into the various machine models and after every 24 hours various parameters like pH, EC, temperature, appearance of compost etc. was monitored. The pH stabiliser was not added if the pH of compost didn't drop. When the pH of compost dropped below 6.5 after adding the organic solid waste then only pH stabilizer SBC, was added into the GOWCM until pH measurement reached till 7.5.
- Compost samples were collected after every 24 hrs. A random sample of compost produced from every waste type after 24 hours was sent to NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) to check the quality of compost as per SWM rules, 2016 and FCO, 2009.
- Also, random matured samples of compost produced from different waste type which was matured after 15, 30, 60, 90, days was also sent to NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) to check the quality of compost as per SWM rules, 2016 and FCO standards, 2009.

Result and Conclusion of testing of various types of Organic waste in different models of Greenius' Organic Waste Composting Machine

- **Observations:**

1. After 7 days it was observed that, all the eleven type of organic solid waste (CW, CHW, RVW, RFW, RGW, CrVW, CrFW, CrGW, HHW, C&MW, AOMSW, RCM, RSFW) tested in all the eight models of GOWC machine (F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250) was decomposed completely and was recycled into compost.
2. Some fibrous parts of less than 5 to 8 % were present in compost. More than 92% of compost was fine powder and light brown to brown in colour.
3. However, some parts of organic waste cannot be decomposed completely like stems, seeds of Fruits and vegetable, coconut shells, chicken Bones, mutton bones, feathers etc. without crushing. If crushed, all organic waste can be decomposed completely in 24 hours.
4. The compost was tested after 24 hours and also after 30 days of maturity. There is only slight difference in characteristic of compost after 24 hrs. and after 30 days of maturity.

- **Results:**
    1. All the parameters of the compost produced from eleven type of waste (CW, CHW, RVW, RFW, RGW, CrVW, CrFW, CrGW, HHW, C&MW, AOMSW, RCM, RSFW,) tested in all the eight models of GOWC machine (F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250), as per (report no., 16 to 26)from NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19), comply with SWM rules, 2016 and FCO standards, 2009.
    2. During the composting process pH was recorded in the range of 7.5 to 6.5, EC was 2.0 to 4.0 dS/m and temperature in range between 50-60 ˚C. Compost appeared to be light brown in color and was Free from of any foul smell.
    3. The compost is Free from of any pathogens and is stable and mature as per the attached reports.
    4. There is only slight difference in characteristic of compost after 24 hrs. And maturity. All the parameters in both the cases comply with SWM rules, 2016 and FCO standards, 2009.

- **Conclusion**:

  Microbial Consortia [redacted] were able to decompose all the eleven different type of organic waste viz., (CW, CHW, RVW, RFW, RGW, CrVW, CrFW, CrGW, HHW, C&MW, AOMSW, RCM, RSFW) in all the eight models (F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250) of GOWC machine and were able to convert into compost within 24 hours.

1. During the composting process bacteria produced enzymes which caused breakdown of the (CW, CHW, RVW, RFW, RGW, CrVW, CrFW, CrGW, HHW, C&MW, AOMSW, RCM, RSFW) into compost.
2. It can be firmly concluded and confirmed that all the eight models (F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250) of GOWC machine converts Organic solid waste into Compost within 24 hours and the results of Compost sample tested from NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) as per reports (report no., 16 to 25), confirm that all the physical, chemical and elemental parameters of the compost produced from all the eleven type of waste is acceptable as per SWM rules, 2016 and FCO standards, 2009.
3. As the pH of compost remains neutral for 6 days even after daily addition of OSW, therefore pH stabilizer SBC is required to be added once in 6 days in the entire eight models GOWC machine for maintaining pH and electrical conductivity of output compost within limits. For all other parameters of compost to be within range, no additives or stabilizers are required to be added in GOWC Machine.
4. As the compost from Greenius' Organic Waste Composting Machine Comply with SWM rules 2016 and FCO standards, 2009 is free from any pathogens, and as it is stable and mature, the compost can be directly used for farming, gardening and plantation. Amount of compost to be added will depend on the testing of that batch of compost and also on the type of plant. And it is always advisable to use the compost as per the user manual of Greenius Food Recycler Pvt Ltd. As the technology and process of Greenius Food Recycler Pvt. Ltd. is same for all its different models of Organic Waste Composting Machines, any other new model manufactured by Greenius, for some other capacity with same process and technology will produce the same result and conclusion.

   The Compost matures more after 30 days, but there is no significant change in the parameters of the compost after 30 days of maturity as compared to the compost after 24 hours.

4.5 Testing of Output Air Quality from Exhaust of various models of Organic Waste Composting Machines of Greenius Food Recycler Pvt. Ltd

1. Air quality from Exhaust of various models F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250 of GOWC machine was tested.
2. Method of sampling for Air quality was as per IS 5182 part 1 (2006), using portable Gas sampler.
3. Collected Gas Sample were analysed at NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) to check the Air quality of GOWC machine.

Results: All the parameters of the exhaust air form GOWC machine models as per report, (Report no., 30) from NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) comply well within Factories act 1948 Standards

Conclusion: From the report of NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) it can be firmly concluded that air quality from exhaust of various machine models comply with Factories act 1948 Standards and does not emit any harmful gases in the environment and is safe to be used in any residential, commercial and industrial premises. Also, it is safe to connect the output air to drainage line and will not cause any harmful effects.

4.6 Testing of Output Water Quality from Exhaust of various models of Organic Waste Composting Machines of Greenius Food Recycler Pvt. Ltd

1. Water quality from Exhaust of various models F-02, F-25, F-75, F-125, F-250, F-500, F-700, F-1250 of GOWC machine was tested.
2. Method of sampling for water quality was as per IS 2296:1992. Water sample was collected in clean sterile can of two litres.
3. Collected Water Sample were analysed at NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) to check the water quality of GOWC machine

- **Results:** All the parameters of the exhaust water form GOWC machine models as per report (Report no., 31).from NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) comply well within Drinking water standards

- **Conclusion**: From the report of NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) it can be firmly concluded that water quality from exhaust of various machine models comply well within Bureau of *Indian Standards* IS 10500: 2012 and any contact of humans with the output water is completely safe. Also, it is safe to connect the output water to drainage line and will not cause any harmful effects.

4.7 Morphological analysis of compost at factory

After the inspection of machine, the main objective was to check the actual output of Greenius's Organic Waste Composting machine i.e. Compost. As mentioned earlier that there are ranges of machines but working of all is same only the size and power rating changes. Therefore, the composition of compost of any organic matter will be the same but only the quantification can be achieved differently. Earlier, some samples of compost were analysed at Aavanira Biotech Lab Pvt. Ltd., Chinchwad, and Pune- 19. Manufacturing of all models were inspected in factory workshop.

The following Exhibits in fig 9 (plates 1-6) show the details of collected and analysed compost samples in the Aavanira.

Plate 1: Compost Sample of Raw Vegetable Waste Collected from Greenius Factory (Machine Model: F – 125)

Plate 2: Compost Sample of Raw Fruit Waste Collected from Greenius Factory (Machine Model: F – 75)

Plate 3: Compost Sample of Crushed Vegetables Waste Collected from Greenius Factory (Machine Model: F – 25)

Plate 4: Compost Sample of Crushed Garden Waste Collected from Greenius Factory (Machine Model: F – 125)

Plate 5: Compost Sample of Raw Chicken Waste Collected from Greenius Factory (Machine Model: F – 75)

Plate 6: Compost Sample of House Hold Waste Without Consortia and pH stabilizer (Machine Model No F – 500)

4.8 Physicochemical analysis of compost at factory site

After the inspection of machine, the main objective was to check the actual output of Greenius's Organic Waste Composting machine i.e. Compost. As mentioned earlier that there are ranges of machines but working of all is same only the size and power rating changes. Therefore, the composition of compost of any organic matter will be the same but only the quantification can be achieved differently. Earlier, some samples of compost were analysed at Aavanira Biotech Lab Pvt. Ltd., Chinchwad, and Pune- 19. Manufacturing of all models were inspected in factory workshop.

Table 9 Physical Characterization of Compost samples for Different Types of Waste (at factory site)

Parameter/ Concen-trations **	Type of Waste												
	Unit	**CW**	**HW**	**RVW**	**RFW**	**RGW**	**CrVW**	**CrFW**	**CrGW**	**HHW**	**C&MW**	**RSFW**	**SWM Rules, 2016***
Colour	-	Black	Brown	Black	Brown	Brown	Brown	Black	Brown	Black	Brown	Black	Dark brown to black
Odour	-	No Foul Odour	No Foul Odour	No Foul Odour	No Foul Odour	No Foul Odour	No Foul Odour	No Foul Odour	No Foul Odour	No Foul Odour	No Foul Odour	No Foul Odour	Absence of foul odour
Particle Size	< 4mm	94	94	95	93	93	96	91	92	95	95	94	Minimum 90% material should pass through 4.0 mm IS sieve
	< 3mm	89	90	90	87	86	90	85	84	90	88	86	
	< 2mm	66	65	55	53	50	52	56	55	70	52	63	
Bulk Density	g/cm^3	0.76	0.81	0.84	0.86	0.71	0.75	0.82	0.87	0.83	0.63	0.87	< 1

*Solid Waste Management Rules, 2016; **The values are average of three readings

Table 10: Chemical Characterization of Compost samples for Different Types of Waste (at factory site)

Parameter/ Concentrations **	Type of Waste												
	Unit	CW	HW	RVW	RFW	RGW	CrVW	CrFW	CrGW	HHW	C&MW	RSFW	SWM Rules, 2016*
pH	-	7.45	7.46	7.40	7.31	7.33	6.69	6.79	6.72	6.70	7.12	6.83	6.5 - 7.5
Electrical Conductivity	ds/m	3.28	3.83	2.01	3.26	3.01	3.18	3.89	3.22	3.49	3.87	3.52	< 4
Total Kjeldhal Nitrogen	% / wt	1.61	1.58	1.54	1.64	1.56	1.37	1.43	1.64	1.63	1.36	1.63	Minimum 0.8
Moisture Content	% / wt	11.64	6.42	14.28	12.49	6.82	7.27	7.95	8.02	12.06	5.45	14.28	15.0 - 25.0
Total Organic Carbon	% / wt	23.32	22.34	21.27	24.80	23.25	22.20	22.59	25.18	22.50	22.30	25.71	Minimum 12.0
C:N Ratio	-	14.51	14.13	13.78	15.08	14.91	16.24	15.75	15.34	13.79	16.36	15.69	< 20
Potassium as K_2O	% / wt	3.54	0.45	0.44	0.49	3.98	2.23	0.70	1.05	0.41	0.46	0.86	Minimum 0.4
Phosphate as P_2O_2	% / wt	4.45	0.58	0.41	8.89	4.63	0.44	0.56	1.82	0.43	0.58	0.72	Minimum 0.4
Zinc (Zn)	mg/kg	BDL	BDL	54.1	16.55	31.05	9.8	54.4	64.45	BDL	27.65	BDL	1000
Copper (Cu)	mg/kg	25.2	44.85	70.1	66.0	115.45	139.55	179.85	199.8	33.0	126.0	39.0	300
Lead (Pb)	mg/kg	1.45	9.95	18.95	16.85	24.85	27.4	35.35	28.85	3.45	28.85	6.21	100
Mercury (Hg)	mg/kg	0.12	BDL	BDL	0.10	0.14	0.11	0.12	0.10	0.05	0.13	0.03	0.15
Arsenic (As)	mg/kg	0.72	BDL	BDL	0.52	1.51	0.59	BDL	BDL	0.46	0.13	0.54	10
Cadmium (Cd)	mg/kg	0.25	0.15	0.3	0.4	0.6	0.55	0.25	0.3	0.1	0.3	0.2	5
Chromium (Cr)	mg/kg	1.35	20.25	25.2	12.1	29.55	14.95	18.75	27.95	17.25	22.0	21.44	50
Nickel(Ni)	mg/kg	0.95	2.35	5.6	3.9	6.1	0.95	3.15	4.95	2.5	7.55	3.8	50

*Solid Waste Management Rules, 2016; **The values are average of three readings

Table11: Specifications of compost by FCO Standards, 2009

Sr. No	Parameters	Values
1.	Moisture	15.0-25.0 % by wt.
2.	Colour	Dark brown to black
3.	Odour	Absence of foul odour
4.	Total organic carbon	12.0 % by wt.
5.	Total Nitrogen (as N)	0.8 % by wt.
6.	Total Phosphates (as P2O5)	0.4 % by wt.
7.	Total Potash (as K2O)	0.4 % by wt.
8.	C/N ratio	<20
9.	pH	6.5 - 7.5

5.0 Performance of machine and composting process at NCL Premises

5.1 Control experiments in pH adjusted and not-adjusted conditions

Experimental plan:

1. In order to check/determine efficacy of thermophilic microorganisms, negative control experiments (microbial inoculum without pH 7.5 and no microbial inoculum without pH 7.5) were carried out.
2. Negative testing was carried out in F-125 machine model. Daily 125Kg of vegetable waste from vegetable market was added in machine for 7 days.
3. Observation was carried out daily after 24hrs for 7 days.

Result and conclusion:

1. The Sample having no microbial inoculum (GN) from Negative experiment did not show any signs of composting. The organic waste – vegetables like potato, brinjal, stems, etc were found in the sample dehydrated and not decomposed.
2. Sample having microbial inoculum (BP) but no pH 7.5 adjusted was composted but parameters were not upto the standards.
3. From above experiments it can be concluded that the for compost formation (composting) microorganisms and pH 7.5 adjustment are needed.
4. Thermophilic microorganisms (consortium) of Greenius' Food Recycler Pvt. Ltd. along with pH 7.5 adjustment strategies were able to efficiently convert vegetable waste into fine compost with compost under FCO parameters. (Report no., 32 to 36).

5.2 Comprehensive Compost experiments

Experimental Plan:

- The objective of the study was to validate the microbes, validate the composting process, test the Organic Waste Composting Machine developed by the Greenius' Food Recycler Pvt. Ltd., test the compost output of Greenius' Organic Waste Composting Machine, Certify the compost output and certify the Organic Waste Composting Machine developed by the Greenius' Food Recycler Pvt. Ltd.
- Experiments were performed and tested by the CSIR-National Chemical Laboratory using model F-75 Kg having processing capacity of 75kg per day. Microbial consortia ([redacted]) *and* daily Average Municipal organic solid waste (Organic Household waste from NCL staff quarters) and Sodium Bicarbonate as pH stabilizer were added for testing of process.
- For the experiment, daily 75 Kg of Average Organic Municipal Solid Waste (Organic Household waste from NCL staff quarters), was added into the F-75 model of GOWC machine according to their capacity. At the beginning, sawdust was added as carrier medium and 6 litres of microbial Inoculum was added on the sawdust separately.
- pH of the Average Organic Municipal Solid Waste (Organic Household waste from NCL staff quarters) and saw dust was measured separately and it was found to be acidic (5-5.5). Initial pH of the organic solid waste samples and saw dust was adjusted to 7.5 by adding pH stabilizer SBC separately.
- For the GOWC machine, Sawdust is used as the carrier medium for Inoculum. While supplying the machine to the customer Greenius supplies it with microbial consortia sprayed on sawdust.
- Experiment was monitored for the period of 8-10 days in the month of October 2020. Average Organic Municipal Solid Waste (Organic Household waste from NCL staff quarters) and also Cooked Canteen Waste was added every day separately into the machine and after every 24 hours various parameters like pH, EC, temperature, appearance of compost etc. was monitored. The pH stabiliser was not added if the pH of compost didn't drop. When the pH of compost dropped below 6.5 after adding the organic solid waste then only pH stabilizer SBC, was added into the GOWCM until pH measurement reached till 7.5. Around 6-8 kg of compost sample was taken out from machine after every 48hrs (considering quantity of compost required for analysis), filled in plastic racks/containers 9having holes of aeration) and kept at natural temperature for maturity. Such 3 racks (named REC-A, REC-B and REC-C) were filled and compost samples were sent for analysis very 1st day (24hrs), 3rd day (72hrs), 6th day(144hrs) and 9th day (216hrs).
- Tests were performed at NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) to check the quality of compost as per SWM rules, 2016 and FCO standards, 2009.
- Air quality from Exhaust of model F-75 of GOWC machine was also tested. Method of sampling for Air quality was as per IS 5182 part 1 (2006), using portable Gas sampler.
- Water quality from Exhaust of model F-75, of GOWC machine was also tested. Method of sampling for water quality was as per IS 2296:1992. Around 1.5 litres of Water sample was collected in clean sterile can of two litres.

Result and Conclusion of validation of machine at National Chemical Laboratory

- **Observations**:

1. After 24hrs it was observed that, Average Organic Municipal Solid Waste tested using F-75 model of GOWC machine was decomposed completely and was converted into compost.
2. Some fibrous parts of less than 5 to 8 % were present in compost. More than 92% of compost was fine powder and light brown in colour.
3. However, some parts of organic waste cannot be decomposed completely like stems, seeds of Fruits and vegetable, coconut shells, chicken Bones, mutton bones, feathers etc. without crushing. If crushed, all organic waste can be decomposed completely in 24 hours.

   The compost was analysed in NABL lab after 24 hours and also after maturing in natural facility at NCL, Pune (3 days,6 days and 9 days).

- **Results**:

1. All the parameters of the compost produced from Average Organic Municipal Solid Waste using F-75 model of GOWC machine, as per (report no., 37 to 48) from NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) comply with SWM rules, 2016 and FCO standards, 2009.
2. During the composting process pH was recorded in the range of 7.5 to 6.5, EC was 2.0 to 4.0 dS/m and temperature in range between 50-60 ˚C. Compost appeared to be light brown to brown in colour and was Free from of any foul smell.
3. The compost is Free from of any pathogens and is stable and mature.
4. There is only slight difference in characteristic after 24 hrs and maturity, but does not hamper parameters.All the parameters in both the cases comply with SWM rules, 2016 and FCO standards, 2009.
5. All the parameters of the exhaust air form GOWC machine models as per report, from NCL Laboratory, Pune comply well within Factories act 1948 Standards (Report no.,49)
6. All the parameters of the exhaust water form GOWC machine models as per report from NCL Laboratory, Pune comply well within Drinking water standards. (Report no.,50)

Conclusion:

1. [redacted] were able to decompose all Average Organic Municipal Solid Waste using F-75 model of GOWC machine the into compost within 24 hours.
2. During the composting process bacteria produced enzymes which caused breakdown of the AOMSW, of GOWC machine converts Organic solid waste into Compost within 24 hours and the results of Compost sample tested from NABL Lab (Aavanira Biotech (P) Ltd., Chinchwad, Pune – 19) confirm that all the physical, chemical and elemental parameters of the compost produced from AOMSW is acceptable as per SWM rules, 2016 and FCO standards, 2009.
3. As the pH of compost remains neutral for 6 days even after daily addition of OSW, therefore pH stabilizer SBC is required to be added once in 6 days in F-75 model of GOWC machine for maintaining pH and electrical conductivity of output compost within limits. For all other parameters of compost to be within range, no additives or stabilizers are required to be added in GOWC Machine.
4. As the compost from Greenius' Organic Waste Composting Machine comply with SWM rules 2016 and FCO standards, 2009 free from of any pathogens, and as it is stable and mature the compost can be used directly for farming, gardening and plantation. Amount of compost to be added will depend on the testing of that batch of compost and also on the type of plant. And it is always advisable to use as per the user manual of Greenius Food Recycler Pvt Ltd. As the technology and process of Greenius Food Recycler Pvt. Ltd. is same for all its different models of Organic Waste Composting Machines, any other new model manufactured by Greenius, for some other capacity with same process and technology will produce the same result and conclusion.
5. The Compost matures more after 30 days, but there is no significant change in the parameters of the compost after 30 days of maturity as compared to the compost after 24 hours.
6. From the report (report no.,49) it can be firmly concluded that air quality from exhaust of various machine models Comply with Factories act 1948 Standards and does not emit any harmful gases in the environment and is safe to be used in any residential, commercial and industrial premises. Also, it is safe to connect the output air to drainage line and will not cause any harmful effects.

   From the report (report no.,50) it can be firmly concluded that water quality from exhaust of various machine models is comply with Bureau of Indian Standards IS 10500: 2012 and any contact of humans with the output water is completely safe. Also, it is safe to connect the output water to drainage line and will not cause any harmful effects.

6.0 Final Conclusion

1. Various bacterial pathogens (belonging to Coliforms and *Salmonella*) were detected in untreated Organic Food waste kept inside the kitchens / homes. Due to their growth, it would which create obnoxious smell and makes house unhealthy and dirty, within shorter period of storage as well.

2. The process having innovative bacterial consortium in combination with a pH stabilizer and Organic Waste Composting Machine developed by Greenius Food recycler Pvt Ltd, produced permissible quality compost from Average Organic Solid Waste within 24 hours under thermophilic conditions.

3. Almost all the parameters of compost produced by Greenius' Organic Waste Composting Machine (without using pH stabiliser) complies with Solid Waste Management Rules SWM Rules, 2016 and FCO standards, 2009 except for pH and electrical conductivity (which are slightly out of range).

4. Sodium Bicarbonate performed as the better pH stabilizer as compared to other stabilizers tested and can be used once in 6-8 days depending upon input waste for OWC machine of Greenius Food recycler Pvt Ltd for achieving compost having permissible pH and electrical conductivity, as per Solid Waste Management Rules SWM Rules, 2016 and FCO standards, 2009.

5. The parameters of compost produced by Greenius' Organic Waste Composting Machine from Average Municipal Solid Waste (viz. Households, Canteens, Hotels, Restaurants, Temples, Vegetable Markets, Gardens, Raw Fruits & Vegetables, Non-Veg Waste, etc.) comply with Solid Waste Management Rules SWM Rules, 2016 and FCO standards, 2009 after 24 hours.

6. The parameters of compost produced by Greenius' Organic Waste Composting Machine also depend upon input organic waste and if the input organic waste is imbalanced, then the output compost will also could be imbalanced.

7. The compost produced by Organic Waste Composting Machine of Greenius Food recycler Pvt Ltd. is free from of any bacterial pathogens and is stable and matured enough to be used directly after 24 hours for farming, plantation and gardening, as

it is within limits of FCO guidelines. Amount of compost to be added, will depend on the testing of that batch of compost and also on the type of plant. It is always advisable to use the compost as per the user manual of Greenius Food Recycler Pvt Ltd. The compost produced by Organic Waste Composting Machine of Greenius Food Recycler Pvt Ltd. matures better after 15-30 days, but there is no significant change in the parameters of the compost after 30 days of maturity as compared to the 24 hrs compost.

8. Dosage and Frequency of addition of pH stabilizer (Sodium Bicarbonate/SBC) depends on the capacity of composting machine and should be as per table 3. If the end user /customer does not add pH stabilizer SBC, then all the parameters of compost produced by GOWC machine, as per SWM rules, 2016 and FCO standards, 2009, Will still be within the range except for pH and EC. The compost in this case can be used by diluting it with soil or after maturing it for 15-30 days or more.

9. Air quality from exhaust of various machine models comply with Factories act 1948 Standards and does not emit any harmful gases in the environment and is safe to be used in any residential, commercial and industrial premises. Also, it is safe to connect the output air to drainage line and will not cause any harmful effects.

10. Water quality from exhaust of various machine models comply with Bureau of Indian Standards IS 10500: 2012 and any contact of humans with the output water is completely safe. Also, it is safe to connect the output water to drainage line and will not cause any harmful effects.

11. As the technology and process of Greenius Food Recycler Pvt. Ltd. is same for all its different models of Organic Waste Composting Machines, any other new model Organic Waste Composting Machine, manufactured by Greenius, for some other capacity with similar process and technology will produce the same results and conclusions.

12. Greenius' Organic Waste Composting Machine is fully automatic and compact in size. Machine has an innovative design and uses good engineering applications & technology, as well as it has high quality components.

13. As it is an in-vessel technology, there is no problem of flies, rats, rodents or insects. Greenius' Organic Waste Composting Machine converts organic waste to good quality compost after 24 hours with a volume reduction of more than 80-90% and no curing is required.

14. Greenius' Organic Waste Composting Machine is noiseless, odourless and it is least maintenance or zero maintenance and runs on optimal electricity.

15. Greenius' Organic Waste Composting Machine is a scientific and green solution to dispose off Organic Waste in a hygienic and healthy manner in the form of eco-friendly compost.

Suggestions for further improvements:

1. Having portable pH meter in-built in machine would be ideal to decide quantity of pH stabilizer to be added. This will save excess use and wastage of stabilizer thereby making the process more economic.
2. Operating in hybrid mode (electric and solar mode) would make it much more affordable and energy efficient.

7.0 Annexure:

Report 1: Temple waste compost report using CCB as pH Stabilizer

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Aavanira® BIOTECH

Recognized by Ministry of Environment and Forest (MoEF), Govt. of India
ISO 9001: 2015 and OHSAS 18001: 2007Certified Company

ENalyse*

Test Report REPORT NO- AB/GFR/01/2019-20/109

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/01/2019-20/109
	Sample Name	25 KG Machine Compost Sample
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	03/01/2020
	Sample Received on Date	06/01/2020
	Analysis Date	06/01/2020 to 10/01/2020
	Reporting Date	11/01/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid Waste Compost	Unit	Standard Method
Physical Parameter						
1.	Colour	Yellowish Brown		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<2mm	17.2	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	52.3			
		<0.05mm	8.4			
Chemical Parameter						
1.	pH	6.9		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Electrical Conductivity	3.5		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
3.	Total Kjeldhal Nitrogen	1.53		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	24.05		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	19.64		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
6.	C:N Ratio	12.8		<20	--	--
7.	Bulk Density	0.86		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
Elemental Parameter						
1.	Potassium as K_2O	0.6		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.4		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	38.25		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	23.8		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	9.5		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	BDL		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	0.0002		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.15		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	7.75		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	3.55		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD.

Report 2: Canteen waste compost report using ABC as pH Stabilizer

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ENalyse*

Test Report REPORT NO- AB/GFR/11/2019-20/833

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/11/2019-20/833
	Sample Name	2 KG Machine Canteen Compost
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	23/11/2019
	Sample Received on Date	23/11/2019
	Analysis Date	25/11/2019 to 30/11/2019
	Reporting Date	30/11/2019
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid Waste Compost	Unit	Standard Method
Physical Parameter						
1.	Colour	Yellowish Brown		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<2mm	66.8	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	13.3			
		<0.05mm	3.2			
Chemical Parameter						
1.	pH	6.91		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Electrical Conductivity	7.71		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
3.	Total Kjeldhal Nitrogen	1.71		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	3.07		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	28.16		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
6.	C:N Ratio	16.48		<20	--	--
7.	Bulk Density	0.85		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
Elemental Parameter						
1.	Potassium as K_2O	0.59		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.42		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	46.29		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	90.86		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	7.98		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.14		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	0.5		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.63		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	12.89		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	2.65		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Page 1 of 1

Report 3: Hotel waste compost report using SBC as pH Stabilizer

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ISO 9001: 2015 and OHSAS 18001: 2007Certified Company

ENalyse*

Test Report REPORT NO- AB/GFR/11/2019-20/832

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/11/2019-20/832
	Sample Name	2 KG Machine Hotel Compost
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	23/11/2019
	Sample Received on Date	23/11/2019
	Analysis Date	25/11/2019 to 30/11/2019
	Reporting Date	30/11/2019
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid Waste Compost	Unit	Standard Method
Physical Parameter						
1.	Colour	Yellowish Brown		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<2mm	69.4	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	15.4			
		<0.05mm	4.5			
Chemical Parameter						
1.	pH	6.86		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Electrical Conductivity	0.58		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
3.	Total Kjeldhal Nitrogen	1.66		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	4.96		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	24.95		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
6.	C:N Ratio	15.03		<20	--	--
7.	Bulk Density	0.86		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
Elemental Parameter						
1.	Potassium as K_2O	0.86		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.71		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	34.02		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	54.82		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	5.44		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.13		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	0.6		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.28		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	10.47		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	3.16		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

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Report 4: Household waste compost report using NaOH as pH Stabilizer

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Test Report REPORT NO- AB/GFR/11/2019-20/831

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/11/2019-20/831
	Sample Name	2 KG Machine Household Compost
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	23/11/2019
	Sample Received on Date	23/11/2019
	Analysis Date	25/11/2019 to 30/11/2019
	Reporting Date	30/11/2019
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid Waste Compost	Unit	Standard Method
Physical Parameter						
1.	Colour	Yellow Brown		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<2mm	65.7	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	12.3			
		<0.05mm	3.4			
Chemical Parameter						
1.	pH	7.28		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Electrical Conductivity	2.49		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
3.	Total Kjeldhal Nitrogen	1.98		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	2.12		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	29.50		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
6.	C:N Ratio	14.89		<20	--	--
7.	Bulk Density	0.76		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
Elemental Parameter						
1.	Potassium as K_2O	0.67		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.54		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	34.69		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	45.15		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	4.45		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.10		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	0.7		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.27		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	11.4		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	3.08		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

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Report 5: Household waste compost report using SBC as pH Stabilizer

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Test Report REPORT NO- AB/GFR/11/2019-20/830

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/11/2019-20/830
	Sample Name	25 KG Machine Household Compost
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	23/11/2019
	Sample Received on Date	23/11/2019
	Analysis Date	25/11/2019 to 30/11/2019
	Reporting Date	30/11/2019
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid Waste Compost	Unit	Standard Method
	Physical Parameter					
1.	Colour	Yellow Brown		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<2mm	62.3	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	11.9			
		<0.05mm	2.6			
	Chemical Parameter					
1.	pH	6.58		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Electrical Conductivity	1.25		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
3.	Total Kjeldhal Nitrogen	1.76		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	3.34		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	26.92		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
6.	C:N Ratio	15.26		<20	--	--
7.	Bulk Density	0.82		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
	Elemental Parameter					
1.	Potassium as K_2O	0.89		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.62		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	44.18		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	72.08		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	8.06		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.12		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	BDL		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.47		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	41.5		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	4.37		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

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Report 6: Testing of Pathogens in Average Organic Solid Waste from Garbage in Various Home Sample 1

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Test Report REPORT NO.-AB/RPO/03/2019-20/04

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/03/2019-20/04
	Sample Name	Akash Design Food Waste 01/03/2020
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Sample Type	Food Waste
	Sample Collected On	01/03/2020
	Sample Received on Date	02/03/2020
	Analysis Date	06/03/2020 to 16/03/2020
	Reporting Date	17/03/2020
Sample returned /stored	Sample discarded after completion of analysis	

Sr. No.	Parameter	Results	Units	Standard Method
	Microbiological Parameter			
1.	Total Bacterial Count	>250	cfu/gm	IS: 5402 2012
2.	Coliforms	Present	per 25 gm	IS: 5401 Part-2 2012
3.	*E.coli*	Absent	per 25 gm	IS: 5887 Part-1 1976 (R.A: 2005)
4.	*Salmonella*	Present	per 25 gm	IS: 5887 Part-3 1999 (R.A: 2005)
5.	*S.aureus*	Absent	per 10 gm	IS: 5887 Part-2 1976 (R.A: 2005)
6.	Fecal streptococci	Absent	<100 cfu/gm	IS: 5887 Part-2 1976 (R.A: 2005)

Verified By – Quality Manager

Govt. Analyst

Authorized By – Technical Manager / Dy. Technical Manager

-----End of Report-----

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Report 7: Testing of Pathogens in Average Organic Solid Waste from Garbage in Various Home Sample 2

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Test Report REPORT NO.-AB/RPO/03/2019-20/05

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/03/2019-20/05
	Sample Name	Sandip Kadam 01/03/2020
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Sample Type	Food Waste
	Sample Collected On	01/03/2020
	Sample Received on Date	02/03/2020
	Analysis Date	06/03/2020 to 16/03/2020
	Reporting Date	17/03/2020
Sample returned /stored	Sample discarded after completion of analysis	

Sr. No.	Parameter	Results	Units	Standard Method
	Microbiological Parameter			
1.	Total Bacterial Count	>250	cfu/gm	IS: 5402 2012
2.	Coliforms	Present	per 25 gm	IS: 5401 Part-2 2012
3.	*E.coli*	Absent	per 25 gm	IS: 5887 Part-1 1976 (R.A: 2005)
4.	*Salmonella*	Absent	per 25 gm	IS: 5887 Part-3 1999 (R.A: 2005)
5.	*S.aureus*	Absent	per 10 gm	IS: 5887 Part-2 1976 (R.A: 2005)
6.	Fecal streptococci	Absent	<100 cfu/gm	IS: 5887 Part-2 1976 (R.A: 2005)

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

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Report 8: Testing of Pathogens in Average Organic Solid Waste from Garbage in Various Home Sample 3

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Test Report REPORT NO.-AB/RPO/03/2019-20/06

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/03/2019-20/06
	Sample Name	Tushar Gorane 01/03/2020
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Sample Type	Food Waste
	Sample Collected On	01/03/2020
	Sample Received on Date	02/03/2020
	Analysis Date	06/03/2020 to 16/03/2020
	Reporting Date	17/03/2020
Sample returned /stored	Sample discarded after completion of analysis	

Sr. No.	Parameter	Results	Units	Standard Method
Microbiological Parameter				
1.	Total Bacterial Count	>250	cfu/gm	IS: 5402 2012
2.	Coliforms	Present	per 25 gm	IS: 5401 Part-2 2012
3.	*E.coli*	Absent	per 25 gm	IS: 5887 Part-1 1976 (R.A: 2005)
4.	*Salmonella*	Present	per 25 gm	IS: 5887 Part-3 1999 (R.A: 2005)
5.	*S.aureus*	Absent	per 10 gm	IS: 5887 Part-2 1976 (R.A: 2005)
6.	Fecal streptococci	Absent	<100 cfu/gm	IS: 5887 Part-2 1976 (R.A: 2005)

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

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Report 9: Testing of Pathogens in Average Organic Solid Waste from Garbage in Various Home Sample 4

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Test Report		REPORT NO.-AB/RPO/03/2019-20/07
Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/03/2019-20/07
	Sample Name	Renuka 01/03/2020
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Sample Type	Food Waste
	Sample Collected On	01/03/2020
	Sample Received on Date	02/03/2020
	Analysis Date	06/03/2020 to 16/03/2020
	Reporting Date	17/03/2020
Sample returned /stored	Sample discarded after completion of analysis	

Sr. No.	Parameter	Results	Units	Standard Method
	Microbiological Parameter			
1.	Total Bacterial Count	>250	cfu/gm	IS: 5402 2012
2.	Coliforms	Present	per 25 gm	IS: 5401 Part-2 2012
3.	*E.coli*	Absent	per 25 gm	IS: 5887 Part-1 1976 (R.A: 2005)
4.	*Salmonella*	Present	per 25 gm	IS: 5887 Part-3 1999 (R.A: 2005)
5.	*S.aureus*	Absent	per 10 gm	IS: 5887 Part-2 1976 (R.A: 2005)
6.	Fecal streptococci	Absent	<100 cfu/gm	IS: 5887 Part-2 1976 (R.A: 2005)

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

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Report 10: Testing of Pathogens in Average Organic Solid Waste from Garbage in Various Home Sample 5

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Test Report		REPORT NO.-AB/RPO/03/2019-20/08
Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/03/2019-20/08
	Sample Name	Kavita 01/03/2020
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Sample Type	Food Waste
	Sample Collected On	01/03/2020
	Sample Received on Date	02/03/2020
	Analysis Date	06/03/2020 to 16/03/2020
	Reporting Date	17/03/2020
Sample returned /stored	Sample discarded after completion of analysis	

Sr. No.	Parameter	Results	Units	Standard Method
Microbiological Parameter				
1.	Total Bacterial Count	>250	cfu/gm	IS: 5402 2012
2.	Coliforms	Present	per 25 gm	IS: 5401 Part-2 2012
3.	*E.coli*	Absent	per 25 gm	IS: 5887 Part-1 1976 (R.A: 2005)
4.	*Salmonella*	Present	per 25 gm	IS: 5887 Part-3 1999 (R.A: 2005)
5.	*S.aureus*	Absent	per 10 gm	IS: 5887 Part-2 1976 (R.A: 2005)
6.	Fecal streptococci	Absent	<100 cfu/gm	IS: 5887 Part-2 1976 (R.A: 2005)

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst
-----End of Report-----

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Report 11: Testing of Pathogens in Average Organic Solid Waste from Garbage in Various Home Sample 6

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Test Report REPORT NO.-AB/RPO/03/2019-20/09

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/03/2019-20/09
	Sample Name	Nitin 01/03/2020
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Sample Type	Food Waste
	Sample Collected On	01/03/2020
	Sample Received on Date	02/03/2020
	Analysis Date	06/03/2020 to 16/03/2020
	Reporting Date	17/03/2020
Sample returned /stored	Sample discarded after completion of analysis	

Sr. No.	Parameter	Results	Units	Standard Method
Microbiological Parameter				
1.	Total Bacterial Count	>250	cfu/gm	IS: 5402 2012
2.	Coliforms	Present	per 25 gm	IS: 5401 Part-2 2012
3.	*E.coli*	Absent	per 25 gm	IS: 5887 Part-1 1976 (R.A: 2005)
4.	*Salmonella*	Absent	per 25 gm	IS: 5887 Part-3 1999 (R.A: 2005)
5.	*S.aureus*	Absent	per 10 gm	IS: 5887 Part-2 1976 (R.A: 2005)
6.	Fecal streptococci	Absent	<100 cfu/gm	IS: 5887 Part-2 1976 (R.A: 2005)

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

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Report 12: Testing of Pathogens in Average Organic Solid Waste from Garbage in Various Home Sample 7

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Test Report		REPORT NO.-AB/RPO/03/2019-20/10
Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/03/2019-20/10
	Sample Name	Kalpana Chavan-1 01/03/2020
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Sample Type	Food Waste
	Sample Collected On	01/03/2020
	Sample Received on Date	02/03/2020
	Analysis Date	06/03/2020 to 16/03/2020
	Reporting Date	17/03/2020
Sample returned /stored	Sample discarded after completion of analysis	

Sr. No.	Parameter	Results	Units	Standard Method
Microbiological Parameter				
1.	Total Bacterial Count	>250	cfu/gm	IS: 5402 2012
2.	Coliforms	Present	per 25 gm	IS: 5401 Part-2 2012
3.	*E.coli*	Absent	per 25 gm	IS: 5887 Part-1 1976 (R.A: 2005)
4.	*Salmonella*	Present	per 25 gm	IS: 5887 Part-3 1999 (R.A: 2005)
5.	*S.aureus*	Absent	per 10 gm	IS: 5887 Part-2 1976 (R.A: 2005)
6.	Fecal streptococci	Absent	<100 cfu/gm	IS: 5887 Part-2 1976 (R.A: 2005)

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. PUNE

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Report 13: Testing of Pathogens in Average Organic Solid Waste from Garbage in Various Home Sample 8

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Test Report		REPORT NO.-AB/RPO/03/2019-20/11
Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/03/2019-20/11
	Sample Name	Shweta -1 01/03/2020
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Sample Type	Food Waste
	Sample Collected On	01/03/2020
	Sample Received on Date	02/03/2020
	Analysis Date	06/03/2020 to 16/03/2020
	Reporting Date	17/03/2020
Sample returned /stored	Sample discarded after completion of analysis	

Sr. No.	Parameter	Results	Units	Standard Method
	Microbiological Parameter			
1.	Total Bacterial Count	>250	cfu/gm	IS: 5402 2012
2.	Coliforms	Present	per 25 gm	IS: 5401 Part-2 2012
3.	*E.coli*	Absent	per 25 gm	IS: 5887 Part-1 1976 (R.A: 2005)
4.	*Salmonella*	Absent	per 25 gm	IS: 5887 Part-3 1999 (R.A: 2005)
5.	*S.aureus*	Absent	per 10 gm	IS: 5887 Part-2 1976 (R.A: 2005)
6.	Fecal streptococci	Absent	<100 cfu/gm	IS: 5887 Part-2 1976 (R.A: 2005)

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

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Report 14: Testing of Pathogens in Average Organic Solid Waste from Garbage in Various Home Sample 9

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Test Report REPORT NO.-AB/RPO/03/2019-20/14

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/03/2019-20/14
	Sample Name	Swapna B -2 01/03/2020
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Sample Type	Food Waste
	Sample Collected On	01/03/2020
	Sample Received on Date	02/03/2020
	Analysis Date	06/03/2020 to 16/03/2020
	Reporting Date	17/03/2020
Sample returned /stored	Sample discarded after completion of analysis	

Sr. No.	Parameter	Results	Units	Standard Method
	Microbiological Parameter			
1.	Total Bacterial Count	>250	cfu/gm	IS: 5402 2012
2.	Coliforms	Present	per 25 gm	IS: 5401 Part-2 2012
3.	*E.coli*	Absent	per 25 gm	IS: 5887 Part-1 1976 (R.A: 2005)
4.	*Salmonella*	Present	per 25 gm	IS: 5887 Part-3 1999 (R.A: 2005)
5.	*S.aureus*	Absent	per 10 gm	IS: 5887 Part-2 1976 (R.A: 2005)
6.	Fecal streptococci	Absent	<100 cfu/gm	IS: 5887 Part-2 1976 (R.A: 2005)

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Page 1 of 1

Report 15: Testing of Pathogens in Average Organic Solid Waste from Garbage in Various Home Sample 10

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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CIN NO. U74900PN2010PTC137544

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Test Report		REPORT NO.-AB/RPO/03/2019-20/15
Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/03/2019-20/15
	Sample Name	Bipin Sir 01/03/2020
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Sample Type	Food Waste
	Sample Collected On	01/03/2020
	Sample Received on Date	02/03/2020
	Analysis Date	06/03/2020 to 16/03/2020
	Reporting Date	17/03/2020
Sample returned /stored	Sample discarded after completion of analysis	

Sr. No.	Parameter	Results	Units	Standard Method
	Microbiological Parameter			
1.	Total Bacterial Count	>250	cfu/gm	IS: 5402 2012
2.	Coliforms	Present	per 25 gm	IS: 5401 Part-2 2012
3.	*E.coli*	Absent	per 25 gm	IS: 5887 Part-1 1976 (R.A: 2005)
4.	*Salmonella*	Absent	per 25 gm	IS: 5887 Part-3 1999 (R.A: 2005)
5.	*S.aureus*	Absent	per 10 gm	IS: 5887 Part-2 1976 (R.A: 2005)
6.	Fecal streptococci	Absent	<100 cfu/gm	IS: 5887 Part-2 1976 (R.A: 2005)

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Page 1 of 1

Report 16: Cooked waste (CW) compost analysis report

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part, MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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ENalyse*

Test Report REPORT NO- AB/GFR/03/2019-20/650

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/03/2019-20/650
	Sample Name	CW – F - 700
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost Sample
	Sample Collected On	11/03/2020
	Sample Received on Date	11/03/2020
	Analysis Date	12/03/2020 to 16/03/2020
	Reporting Date	16/03/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid	Unit	Standard Method
Physical Parameter						
1.	Colour	Black		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm	94	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	89			
		<2mm	66			
Chemical Parameter						
1.	pH	7.45		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th
2.	Electrical Conductivity	3.28		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th
3.	Total Kjeldhal Nitrogen	1.61		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	11.64		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	23.32		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th
6.	C:N Ratio	14.51		<20	--	--
7.	Bulk Density	0.76		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th
Elemental Parameter						
1.	Potassium as K_2O	3.54		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	4.45		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	BDL		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	25.2		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	1.45		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.12		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	0.72		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.25		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	1.35		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	0.95		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Govt. Analyst

Authorized By – Technical Manager / Dy. Technical Manager

Report 17: Cooked Hotel Waste (HW) compost analysis report

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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Test Report REPORT NO- AB/GFR/03/2019-20/647

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/03/2019-20/647
	Sample Name	HW – F- 250
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost Sample
	Sample Collected On	11/03/2020
	Sample Received on Date	11/03/2020
	Analysis Date	12/03/2020 to 16/03/2020
	Reporting Date	16/03/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid	Unit	Standard Method
Physical Parameter						
1.	Colour	Brown		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm	94	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	90			
		<2mm	65			
Chemical Parameter						
1.	pH	7.46		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th
2.	Electrical Conductivity	3.83		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th
3.	Total Kjeldhal Nitrogen	1.58		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	6.42		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	22.34		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th
6.	C:N Ratio	14.13		<20	--	--
7.	Bulk Density	0.81		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th
Elemental Parameter						
1.	Potassium as K_2O	0.45		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.58		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	BDL		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	44.85		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	9.95		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	BDL		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	BDL		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.15		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	20.25		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	2.35		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. PUNE

Report 18: Raw Vegetable Waste (RVW) compost analysis report

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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CIN NO. U74900PN2010PTC137544

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Test Report REPORT NO- AB/GFR/03/2019-20/648

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/03/2019-20/648
	Sample Name	RVW – F - 125
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost Sample
	Sample Collected On	11/03/2020
	Sample Received on Date	11/03/2020
	Analysis Date	12/03/2020 to 16/03/2020
	Reporting Date	16/03/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid	Unit	Standard Method
Physical Parameter						
1.	Colour	Black		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22rd Edition
3.	Particle Size	<4mm	95	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	90			
		<2mm	55			
Chemical Parameter						
1.	pH	7.40		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th
2.	Electrical Conductivity	2.01		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th
3.	Total Kjeldhal Nitrogen	1.54		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	14.28		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	21.27		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th
6.	C:N Ratio	13.78		<20	--	--
7.	Bulk Density	0.84		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th
Elemental Parameter						
1.	Potassium as K_2O	0.44		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.41		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	54.1		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	70.1		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	18.95		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	BDL		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	BDL		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.3		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	25.2		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	5.6		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Report 19: Raw Fruit Waste (RFW) compost analysis report

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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Test Report REPORT NO- AB/GFR/03/2019-20/649

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/03/2019-20/649
	Sample Name	RFW – F -75
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost Sample
	Sample Collected On	11/03/2020
	Sample Received on Date	11/03/2020
	Analysis Date	12/03/2020 to 16/03/2020
	Reporting Date	16/03/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid	Unit	Standard Method
Physical Parameter						
1.	Colour	Brown		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm	93	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	87			
		<2mm	53			
Chemical Parameter						
1.	pH	7.31		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th
2.	Electrical Conductivity	3.26		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th
3.	Total Kjeldhal Nitrogen	1.64		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	12.49		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	24.80		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th
6.	C:N Ratio	15.08		<20	--	--
7.	Bulk Density	0.86		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th
Elemental Parameter						
1.	Potassium as K_2O	0.49		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	8.89		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	16.55		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	66.0		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	16.85		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.10		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	0.52		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.4		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	12.1		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	3.9		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

AAVANIRA BIOTECH (P) LTD. PUNE

Govt. Analyst

Report 20: Raw Garden Waste (RGW) compost analysis report

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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Test Report REPORT NO- AB/GFR/03/2019-20/651

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/03/2019-20/651
	Sample Name	RGW – F - 75
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost Sample
	Sample Collected On	11/03/2020
	Sample Received on Date	11/03/2020
	Analysis Date	12/03/2020 to 16/03/2020
	Reporting Date	16/03/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid	Unit	Standard Method
	Physical Parameter					
1.	Colour	Brown		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm	93	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	86			
		<2mm	50			
	Chemical Parameter					
1.	pH	7.33		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th
2.	Electrical Conductivity	3.01		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th
3.	Total Kjeldhal Nitrogen	1.56		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	6.82		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	23.25		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th
6.	C:N Ratio	14.91		<20	--	--
7.	Bulk Density	0.71		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th
	Elemental Parameter					
1.	Potassium as K_2O	3.98		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	4.63		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	31.05		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	115.45		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	24.85		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.14		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	1.51		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.6		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	29.55		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	6.1		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

AAVANIRA BIOTECH (P) LTD. PUNE

Report 21: Crushed Vegetable Waste (CrVW) compost analysis report

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
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CIN NO.U74900PN2010PTC137544

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Test Report REPORT NO- AB/GFR/03/2019-20/652

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/03/2019-20/652
	Sample Name	Crushed VW – F – 25
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost Sample
	Sample Collected On	11/03/2020
	Sample Received on Date	11/03/2020
	Analysis Date	12/03/2020 to 16/03/2020
	Reporting Date	16/03/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result	Limits as Per Municipal Solid	Unit	Standard Method
	Physical Parameter				
1.	Colour	Brown	Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour	Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm 96 <3mm 90 <2mm 52	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
	Chemical Parameter				
1.	pH	6.69	6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th
2.	Electrical Conductivity	3.18	<4.0	dS/m	C.A. Black, American Society of Agronomy 5th
3.	Total Kjeldhal Nitrogen	1.37	Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	7.27	<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	22.20	Min 12	%/weight	C.A. Black, American Society of Agronomy 5th
6.	C:N Ratio	16.24	<20	--	--
7.	Bulk Density	0.75	<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th
	Elemental Parameter				
1.	Potassium as K_2O	2.23	Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.44	Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	9.8	<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	139.55	<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	27.4	<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.11	<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	0.59	<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.55	<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	14.95	<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	0.95	<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Govt. Analyst

Authorized By – Technical Manager / Dy. Technical Manager

AAVANIRA BIOTECH (P) LTD. PUNE

Report 22: Crushed Fruit Waste (CrFW) compost analysis report.

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part, MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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Test Report

REPORT NO- AB/GFR/03/2019-20/654

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/03/2019-20/654
	Sample Name	Crushed FW – F - 500
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost Sample
	Sample Collected On	11/03/2020
	Sample Received on Date	11/03/2020
	Analysis Date	12/03/2020 to 16/03/2020
	Reporting Date	16/03/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid	Unit	Standard Method
	Physical Parameter					
1.	Colour	Black		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm	91	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	85			
		<2mm	56			
	Chemical Parameter					
1.	pH	6.79		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th
2.	Electrical Conductivity	3.89		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th
3.	Total Kjeldhal Nitrogen	1.43		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	7.95		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	22.59		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th
6.	C:N Ratio	15.75		<20	--	--
7.	Bulk Density	0.82		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th
	Elemental Parameter					
1.	Potassium as K_2O	0.70		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.56		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	54.4		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	179.85		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	35.35		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.12		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	BDL		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.25		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	18.75		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	3.15		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

Report 23: Crushed Garden Waste (CrGW) compost analysis report

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com

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Test Report REPORT NO- AB/GFR/03/2019-20/655

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/03/2019-20/655
	Sample Name	Crushed GW –F - 125
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost Sample
	Sample Collected On	11/03/2020
	Sample Received on Date	11/03/2020
	Analysis Date	12/03/2020 to 16/03/2020
	Reporting Date	16/03/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid	Unit	Standard Method
Physical Parameter						
1.	Colour	Brown		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm	92	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	84			
		<2mm	55			
Chemical Parameter						
1.	pH	6.72		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th
2.	Electrical Conductivity	3.22		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th
3.	Total Kjeldhal Nitrogen	1.64		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	8.02		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	25.18		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th
6.	C:N Ratio	15.34		<20	--	--
7.	Bulk Density	0.87		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th
Elemental Parameter						
1.	Potassium as K_2O	1.05		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.82		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	64.45		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	199.8		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	28.85		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.10		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	BDL		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.3		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	27.95		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	4.95		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Govt. Analyst

AAVANIRA BIOTECH (P) LTD. * PUNE *

Authorized By – Technical Manager / Dy. Technical Manager

Report 24: Household Waste (HHW) compost analysis report

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part, MIDC Chinchwad, Pune - 411 019. Maharashtra, India
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO:-U74900PN2010PTC137544

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ISO 9001: 2015 and OHSAS 18001: 2007Certified Company

ENalyse*

Test Report REPORT NO- AB/GFR/03/2019-20/646

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/03/2019-20/646
	Sample Name	HHW – F-1250
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost Sample
	Sample Collected On	11/03/2020
	Sample Received on Date	11/03/2020
	Analysis Date	12/03/2020 to 16/03/2020
	Reporting Date	16/03/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid	Unit	Standard Method
Physical Parameter						
1.	Colour	Black		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm	95	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	90			
		<2mm	70			
Chemical Parameter						
1.	pH	6.70		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th
2.	Electrical Conductivity	3.49		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th
3.	Total Kjeldhal Nitrogen	1.63		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	12.06		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	22.50		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th
6.	C:N Ratio	13.79		<20	--	--
7.	Bulk Density	0.83		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th
Elemental Parameter						
1.	Potassium as K_2O	0.41		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.43		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	BDL		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	33.0		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	3.45		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.05		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	0.46		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.1		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	17.25		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	2.5		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Report 25: Crushed and Market Waste (C & MW) compost analysis report

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO.U74900PN2010PTC137541

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ENalyse*

Test Report REPORT NO- AB/GFR/03/2019-20/653

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/03/2019-20/653
	Sample Name	C & MW – F - 75
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost Sample
	Sample Collected On	11/03/2020
	Sample Received on Date	11/03/2020
	Analysis Date	12/03/2020 to 16/03/2020
	Reporting Date	16/03/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid	Unit	Standard Method
	Physical Parameter					
1.	Colour	Brown		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm	95	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	88			
		<2mm	52			
	Chemical Parameter					
1.	pH	7.12		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th
2.	Electrical Conductivity	3.87		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th
3.	Total Kjeldhal Nitrogen	1.36		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	5.45		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	22.30		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th
6.	C:N Ratio	16.36		<20	--	--
7.	Bulk Density	0.63		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th
	Elemental Parameter					
1.	Potassium as K_2O	0.46		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.58		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	27.65		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	126.0		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	28.85		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.13		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_5	0.13		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.3		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	22.0		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	7.55		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

AAVANIRA BIOTECH (P) LTD. * PUNE *

Report 26: Raw Sea Food (Marine) Waste compost analysis report

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part, MIDC Chinchwad, Pune - 411 019. Maharashtra, India
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ENalyse*

Test Report

REPORT NO- AB/GFR/07/2020-21/470

Client Details Name & Address:		
Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/07/2020-21/470
	Sample Name	F-02-Marine Waste
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost Sample
	Sample Collected On	07/07/2020
	Sample Received on Date	07/07/2020
	Analysis Date	09/07/2020 to 15/07/2020
	Reporting Date	16/07/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid	Unit	Standard Method
Physical Parameter						
1.	Colour	Black		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm	94	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	86			
		<2mm	63			
Chemical Parameter						
1.	pH	6.83		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th
2.	Electrical Conductivity	3.52		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th
3.	Total Kjeldhal Nitrogen	1.63		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	14.28		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	25.71		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th
6.	C:N Ratio	15.69		<20	--	--
7.	Bulk Density	0.87		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th
Elemental Parameter						
1.	Potassium as K_2O	0.86		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.72		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	BDL		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	39.0		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	6.21		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.03		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	0.54		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.2		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	21.44		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	3.8		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

AAVANIRA BIOTECH (P) LTD. * PUNE *

Govt. Analyst

-----End of Report-----

Report 27: Matured compost analysis report after 15 days

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/GFR/06/2020-21/1089

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/06/2020-21/1089
	Sample Name	15 Days Maturity Compost- Factory site
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	20/06/2020
	Sample Received on Date	20/06/2020
	Analysis Date	22/06/2020 to 26/06/2020
	Reporting Date	27/06/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid Waste Compost	Unit	Standard Method
Physical Parameter						
1.	Colour	Black		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm	95	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	90			
		<2mm	82			
Chemical Parameter						
1.	pH	7.18		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Electrical Conductivity	1.96		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
3.	Total Kjeldhal Nitrogen	1.68		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	11.45		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	21.60		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
6.	C:N Ratio	12.84		<20	--	By Calculation
7.	Bulk Density	0.83		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
Elemental Parameter						
1.	Potassium as K_2O	0.49		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.45		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	BDL		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	43.0		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	3.1		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.08		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	BDL		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.15		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	11.12		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	3.5		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Report 28: Matured compost analysis report after 30 days

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/GFR/06/2020-21/1088

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/06/2020-21/1088
	Sample Name	30 Days Maturity Compost- Factory site
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	20/06/2020
	Sample Received on Date	20/06/2020
	Analysis Date	22/06/2020 to 26/06/2020
	Reporting Date	27/06/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid Waste Compost	Unit	Standard Method
Physical Parameter						
1.	Colour	Light Brown		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm	92	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	85			
		<2mm	72			
Chemical Parameter						
1.	pH	7.19		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Electrical Conductivity	3.61		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
3.	Total Kjeldhal Nitrogen	1.71		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	15.68		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	22.74		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
6.	C:N Ratio	13.33		<20	--	By Calculation
7.	Bulk Density	0.82		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
Elemental Parameter						
1.	Potassium as K_2O	0.61		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.47		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	BDL		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	41.0		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	3.2		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.08		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	BDL		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.10		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	43.15		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	4.1		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Report 29: Matured compost analysis report after 60 days

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India
■ Tel.: 8308805200 / 8446000118. ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/GFR/06/2020-21/1087

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/06/2020-21/1087
	Sample Name	60 Days Maturity Compost- Factory site
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	20/06/2020
	Sample Received on Date	20/06/2020
	Analysis Date	22/06/2020 to 26/06/2020
	Reporting Date	27/06/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Limits as Per Municipal Solid Waste Compost	Unit	Standard Method
Physical Parameter						
1.	Colour	Light Brown		Dark Brown To Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Odour	Absence Of Foul Odour		Absence Of Foul Odour	--	APHA 22nd Edition
3.	Particle Size	<4mm	95	Min 90 % material should pass through 4.0mm IS sieve	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<3mm	90			
		<2mm	76			
Chemical Parameter						
1.	pH	7.48		6.5 – 7.5	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2.	Electrical Conductivity	3.20		<4.0	dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
3.	Total Kjeldhal Nitrogen	1.72		Min 0.4	%/weight	IS 14684 1999,R.A. 2008
4.	Moisture Content	18.02		<25	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
5.	Total Organic Carbon	23.37		Min 12	%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
6.	C:N Ratio	13.59		<20	--	By Calculation
7.	Bulk Density	0.84		<1.0	gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
Elemental Parameter						
1.	Potassium as K_2O	0.46		Min 0.4	%/weight	USEPA 3050 B
2.	Phosphate as P_2O_5	0.44		Min 0.4	%/weight	USEPA 3050 B
3.	Zinc as Zn	54.0		<1000	mg/kg	USEPA 3050 B
4.	Copper as Cu	35.0		<300	mg/kg	USEPA 3050 B
5.	Lead as Pb	1.13		<100	mg/kg	USEPA 3050 B
6.	Mercury as Hg	0.6		<0.15	mg/kg	USEPA 3050 B
7.	Arsenic as As_2O_3	BDL		<10	mg/kg	USEPA 3050 B
8.	Cadmium as Cd	0.30		<5	mg/kg	USEPA 3050 B
9.	Chromium as Cr	41.15		<50	mg/kg	USEPA 3050 B
10.	Nickel as Ni	5.0		<50	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

----End of Report----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Report 30: Air quality analysis of Exhaust from GOWC machine tested at Factory site

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part, MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Workzone Air Quality Monitoring Report Report No.AB/EES/02/2019-20/722

Name of Client & Address: Greenius Food Recycler Pvt. Ltd. Gat No. 189, Behind Jyotiba Temple, Jyotiba Nagar, Balekar Chowk, Talwade, Pune 412114	Sample Code	AB/EES/02/2019-20/722
	Sample Location	Near Composting Machine 125kg
	Sample Collected By	Aavanira Biotech Pvt. Ltd.,
	Sample type	Workzone Air
	Method of Sampling	As per IS : 5182 Part 1 (2006)
	Date of Sampling	25/02/2020
	Time of Sampling	11:00 am.
	Sampling Duration	01 Hrs.
	Shop Temperature	28.5°C
	Dry Bulb & Wet Bulb Temp.	28.2°C / 19.0°C
	Relative Humidity(RH)	42 %
	Analysis Date	26/02/2020 to 03/03/2020
	Reporting date	03/03/2020
	Instrument Details	Portable Gas Sampler, AB/Tech/Instr/138
Sample returned /stored	Stored at 4°C for 1 week from the date of sampling	

TEST PARAMETERS

Sr. No.	Parameter	Result	Unit	The Factories Act 1948, Standards	Standard Method
1	Sulphur Dioxide (SO_2)	2.90	mg/m^3	< 5	NIOSH METHOD: 6400, Issue 2
2	Nitrogen Dioxide (NO_2)	3.12	mg/m^3	<6	NIOSH METHOD: 6014, Issue 2
3	Ammonia (NH_3)	15.2	mg/m^3	<18	NIOSH METHOD: 6015, Issue 2
4	Hydrogen Sulphide (H_2S)	8.6	mg/m^3	<14	NIOSH METHOD: 6013, Issue 1
5	Carbon Monoxide(CO)	3.20	mg/m^3	<55	NIOSH METHOD: 6603
6	Methane (CH_4)	17.0	mg/m^3	<656 (NIOSH)	NIOSH 1985b
7	Carbon Dioxide(CO_2)	0.22	%	<0.5 (NIOSH)	NIOSH METHOD: 6603

REMARKS / OBSERVATIONS:

- All above results are within The Factories Act, 1948 Standards.

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Page 1 of 1

Report 31: Water quality analysis of Exhaust from GOWC machine tested at Factory site

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/GFR/02/2019-20/837

Client Details Name & Address: Greenius Food Recycler Pvt Ltd	Sample Code	AB/GFR/02/2019-20/837
	Sample Name	Composting M/C Water Sample
	Sample Collected By	Greenius Food Recycler Pvt Ltd
	Method for Sampling	--
	Sample Type	Water Sample
	Sample Collected On	25/02/2020
	Sample Received on Date	26/02/2020
	Analysis Date	26/02/2020 to 02/03/2020
	Reporting Date	03/03/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Results	Limits as per IS 2296:1992	Units	Standard Method
	Physical Parameter				
1	Colour	1.0	10	Hazen	IS: 3025 Part-04 (R.A : 2002)
2	Odour	Agreeable	unobjectionable	--	IS: 3025 Part-05 (R.A : 2002)
3	TDS(Total Dissolved Solids)	632.0	500	mg/lit	IS: 3025 Part-16 (R.A : 2006)
	Chemical Parameter				
1	pH (at 25°C)	3.85	6.5-8.5	--	IS: 3025 Part-11 (R.A : 2002)
2	E Conductivity	1038.09	-	µS/cm	IS: 3025 Part-14 (R.A : 2002)
3	Total Hardness (as $CaCO_3$)	51.43	200	mg/lit	IS: 3025 Part-21 (2009)
4	Chloride (as Cl^-)	523.65	250	mg/lit	IS: 3025 Part-32 (R.A : 2003)
5	Sulphate (as SO_4^{-2})	24.0	400	mg/lit	APHA :23rd edition -(4500- SO_4^{2-} E)
6	Nitrate (as NO_3^{-2})	BDL	20	mg/lit	APHA :23rd edition -(4500-NO_3^{2-} B)
7	Fluorides (as F^-)	BDL	1.5	mg/lit	APHA :23rd edition -(4500-F^- F)
8	Detergent	BDL	-	mg/lit	APHA :23rd edition -(5540 C)
9	Cyanide (as CN^-)	0.005	0.05	mg/lit	Cl. 2 of IS 3025 (Part 27)
10	Total Ammonia (as N)	BDL	-	mg/lit	APHA :23rd edition -(4500-NH_3B and C)
11	Phenolic Compound (as phenol)	BDL	0.002	mg/lit	IS: 3025 Part-43 (R.A : 2003)
12	BOD	80.0	2	mg/lit	IS: 3025 Part-44 (R.A : 2003)
13	COD	1058.25	-	mg/lit	IS: 3025 Part-58 (R.A : 2006)
14	Dissolved Oxygen	BDL	6	mg/lit	IS: 3025 Part-38 (1989)
15	Hexa Chromium	BDL	0.05	mg/lit	APHA :23rd edition ,3500 Cr B
16	Ca Hardness	38.10	200	mg/lit	IS: 3025 Part-21 (2009)
17	Mg Hardness	13.33	200	mg/lit	IS: 3025 Part-21 (2009)
	Elemental Parameter				
1	Arsenic (as As)	0.005	0.05	mg/lit	IS: 3025 Part-02 (2004)
2	Boron (as B)	BDL	-	mg/lit	IS: 3025 Part-02 (2004)
3	Cadmium (as Cd)	0.001	0.01	mg/lit	IS: 3025 Part-02 (2004)
4	Mercury (as Hg)	0.03	0.001	mg/lit	IS: 3025 Part-02 (2004)
5	Lead (as Pb)	0.01	0.1	mg/lit	IS: 3025 Part-02 (2004)

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AAVANIRA BIOTECH (P) LTD. PUNE

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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REPORT NO- AB/GFR/02/2019-20/837

6	Selenium (as Se)	0.002	0.01	mg/lit	IS: 3025 Part-02 (2004)
7	Copper (as Cu)	0.18	1.5	mg/lit	IS: 3025 Part-02 (2004)
8	Manganese (as Mn)	0.15	0.5	mg/lit	IS: 3025 Part-02 (2004)
9	Zinc (as Zn)	0.67	15	mg/lit	IS: 3025 Part-02 (2004)
10	Barium (as Ba)	0.09	1	mg/lit	IS: 3025 Part-02 (2004)
11	Iron as Fe	0.89	0.3	mg/lit	IS: 3025 Part-02 (2004)
		Microbiological Parameter			
1	Total Coliform	1600	50	MPN/100ml	IS: 1622 (R.A : 2014)

BDL- Below Detection Limit
REMARKS / OBSERVATIONS: TDS, pH, Chloride & Total Coliform are not within limits as per IS: 10500(2012) standards.

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst
-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

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Report 32: Compost analysis at NCL site day 1 (Microbial cultures without pH adjustment)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report — REPORT NO- AB/NCL/10/2020-21/226

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/10/2020-21/226
	Sample Name	REC – BP – 1
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	27/10/2020
	Sample Received on Date	28/10/2020
	Analysis Date	28/10/2020 to 03/11/2020
	Reporting Date	04/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	80	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	6		
		<0.05mm	2		
4	pH	5.47		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	3.29		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.22		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	46.88		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	28.87		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	17.26		--	By Calculation
10	Bulk Density	0.84		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.59		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.53		%/weight	USEPA 3050 B
13	Zinc as Zn	42.26		mg/kg	USEPA 3050 B
14	Copper as Cu	33.0		mg/kg	USEPA 3050 B
15	Lead as Pb	1.31		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.01		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	0.01		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.48		mg/kg	USEPA 3050 B
19	Chromium as Cr	37.0		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.18		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

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Report 33: Compost analysis at NCL site day 3 (Microbial cultures without pH adjustment)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part.
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/RPO/10/2020-21/227

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/10/2020-21/227
	Sample Name	REC – BP – 3
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	27/10/2020
	Sample Received on Date	28/10/2020
	Analysis Date	28/10/2020 to 03/11/2020
	Reporting Date	04/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	86	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	6		
		<0.05mm	2		
4	pH	5.11		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	3.28		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.25		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	45.46		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	26.53		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	14.49		--	By Calculation
10	Bulk Density	0.82		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.61		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.54		%/weight	USEPA 3050 B
13	Zinc as Zn	42.76		mg/kg	USEPA 3050 B
14	Copper as Cu	34.12		mg/kg	USEPA 3050 B
15	Lead as Pb	1.34		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.08		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	0.01		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.44		mg/kg	USEPA 3050 B
19	Chromium as Cr	42.0		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.24		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

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Report 34: Compost analysis at NCL site day 6 (Microbial cultures without pH adjustment)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/NCL/11/2020-21/44

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/44
	Sample Name	REC – BP –06
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	03/11/2020
	Sample Received on Date	04/11/2020
	Analysis Date	04/11/2020 to 09/11/2020
	Reporting Date	10/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	88	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	8		
		<0.05mm	2		
4	pH	5.94		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	1.68		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.23		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	42.55		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	23.68		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	19.25		--	By Calculation
10	Bulk Density	0.87		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.57		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.52		%/weight	USEPA 3050 B
13	Zinc as Zn	38.25		mg/kg	USEPA 3050 B
14	Copper as Cu	33.25		mg/kg	USEPA 3050 B
15	Lead as Pb	1.31		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.04		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	0.01		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.38		mg/kg	USEPA 3050 B
19	Chromium as Cr	37.05		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.22		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. PUNE

Page 1 of 1

Report 35: Compost analysis at NCL site day 9 (Microbial cultures without pH adjustment)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report		REPORT NO- AB/NCL/11/2020-21/46
Client Details Name & Address: Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/46
	Sample Name	REC – BP – 9
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	03/11/2020
	Sample Received on Date	04/11/2020
	Analysis Date	04/11/2020 to 09/11/2020
	Reporting Date	10/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	89	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	6		
		<0.05mm	2		
4	pH	5.66		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	1.76		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.26		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	34.16		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	22.50		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	17.81		--	By Calculation
10	Bulk Density	0.87		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.57		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.51		%/weight	USEPA 3050 B
13	Zinc as Zn	44.85		mg/kg	USEPA 3050 B
14	Copper as Cu	31.23		mg/kg	USEPA 3050 B
15	Lead as Pb	1.24		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.06		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	0.01		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.38		mg/kg	USEPA 3050 B
19	Chromium as Cr	41.55		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.28		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Page 1 of 1

Report 36: Compost analysis at NCL site (No microbial cultures and no pH adjustment)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/NCL/11/2020-21/47

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/47
	Sample Name	GN – 1
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	03/11/2020
	Sample Received on Date	04/11/2020
	Analysis Date	04/11/2020 to 09/11/2020
	Reporting Date	10/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Brown		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	64	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	4		
		<0.05mm	1		
4	pH	4.65		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	1.60		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.05		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	68.43		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	19.37		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	18.49		--	By Calculation
10	Bulk Density	0.81		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.55		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.51		%/weight	USEPA 3050 B
13	Zinc as Zn	44.59		mg/kg	USEPA 3050 B
14	Copper as Cu	36.15		mg/kg	USEPA 3050 B
15	Lead as Pb	1.36		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.04		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	0.01		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.49		mg/kg	USEPA 3050 B
19	Chromium as Cr	46.58		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.25		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. PUNE

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Report 37: Compost analysis (day 1) at NCL site (Rack 1/ REC-A1)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/NCL/10/2020-21/224

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/10/2020-21/224
	Sample Name	REC – A – 1
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	27/10/2020
	Sample Received on Date	28/10/2020
	Analysis Date	28/10/2020 to 03/11/2020
	Reporting Date	04/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	95	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	6		
		<0.05mm	2		
4	pH	7.7		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	4.2		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.21		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	24.45		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	29.83		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	16.58		--	By Calculation
10	Bulk Density	0.87		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.53		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.49		%/weight	USEPA 3050 B
13	Zinc as Zn	41.53		mg/kg	USEPA 3050 B
14	Copper as Cu	32.0		mg/kg	USEPA 3050 B
15	Lead as Pb	1.29		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.09		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	BDL		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.47		mg/kg	USEPA 3050 B
19	Chromium as Cr	39.0		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.16		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Page 1 of 1

Report 38: Compost analysis (day 3) at NCL site (Rack 1/ REC-A3)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/NCL/11/2020-21/42

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/42
	Sample Name	REC – A - 03
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	03/11/2020
	Sample Received on Date	04/11/2020
	Analysis Date	04/11/2020 to 09/11/2020
	Reporting Date	10/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	96	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	2		
		<0.05mm	2		
4	pH	7.6		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	4.1		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.59		%/weight	IS 14684 1999, R.A. 2008
7	Moisture Content	21.32		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	26.25		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	16.54		--	By Calculation
10	Bulk Density	0.87		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.54		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.48		%/weight	USEPA 3050 B
13	Zinc as Zn	40.21		mg/kg	USEPA 3050 B
14	Copper as Cu	31.26		mg/kg	USEPA 3050 B
15	Lead as Pb	1.24		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.04		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	0.001		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.46		mg/kg	USEPA 3050 B
19	Chromium as Cr	34.72		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.18		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Page 1 of 1

Report 39: Compost analysis (day 6) at NCL site (Rack 1/ REC-A6)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/NCL/11/2020-21/43

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/43
	Sample Name	REC – A – 6
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	03/11/2020
	Sample Received on Date	04/11/2020
	Analysis Date	04/11/2020 to 09/11/2020
	Reporting Date	10/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	97	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	4		
		<0.05mm	1		
4	pH	7.5		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	4.5		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.74		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	20.12		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	26.60		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	15.25		--	By Calculation
10	Bulk Density	0.84		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.57		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.51		%/weight	USEPA 3050 B
13	Zinc as Zn	41.22		mg/kg	USEPA 3050 B
14	Copper as Cu	35.26		mg/kg	USEPA 3050 B
15	Lead as Pb	1.22		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.04		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	0.01		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.41		mg/kg	USEPA 3050 B
19	Chromium as Cr	40.57		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.21		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. PUNE

Page 1 of 1

Report 40: Compost analysis (day 9) at NCL site (Rack 1/ REC-A9)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part, MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118. ■ E-mail : info@aavanira.com. ■ Web : www.aavanira.com
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ENalyse*

Test Report REPORT NO- AB/NCL/11/2020-21/166

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/166
	Sample Name	REC – A - 9
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	09/11/2020
	Sample Received on Date	10/11/2020
	Analysis Date	10/11/2020 to 19/11/2020
	Reporting Date	20/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	98	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	4		
		<0.05mm	2		
4	pH	7.8		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	4.6		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.44		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	19.35		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	23.78		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	16.21		--	By Calculation
10	Bulk Density	0.82		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.54		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.46		%/weight	USEPA 3050 B
13	Zinc as Zn	37.58		mg/kg	USEPA 3050 B
14	Copper as Cu	29.05		mg/kg	USEPA 3050 B
15	Lead as Pb	1.26		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.07		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	BDL		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.36		mg/kg	USEPA 3050 B
19	Chromium as Cr	34.20		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.13		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Page 1 of 1

Report 41: Compost analysis (day 1) at NCL site (Rack 2/REC B1)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
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ENalyse*

Test Report REPORT NO- AB/NCL/11/2020-21/40

Client Details Name & Address: Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/40
	Sample Name	REC – B – 1
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	03/11/2020
	Sample Received on Date	04/11/2020
	Analysis Date	04/11/2020 to 09/11/2020
	Reporting Date	10/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	92	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	4		
		<0.05mm	1		
4	pH	7.07		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	3.4		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.69		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	22.2		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	26.73		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	15.82		--	By Calculation
10	Bulk Density	0.86		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.51		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.43		%/weight	USEPA 3050 B
13	Zinc as Zn	37.55		mg/kg	USEPA 3050 B
14	Copper as Cu	28.0		mg/kg	USEPA 3050 B
15	Lead as Pb	1.11		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.07		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	BDL		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.36		mg/kg	USEPA 3050 B
19	Chromium as Cr	34.0		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.11		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Page 1 of 1

Report 42: Compost analysis (day 3) at NCL site (Rack 2/REC B3)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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Test Report REPORT NO- AB/NCL/11/2020-21/41

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/41
	Sample Name	REC – B - 3
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	03/11/2020
	Sample Received on Date	04/11/2020
	Analysis Date	04/11/2020 to 09/11/2020
	Reporting Date	10/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	95	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	2		
		<0.05mm	1		
4	pH	7.43		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	3.8		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.46		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	20.56		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	25.54		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	17.48		--	By Calculation
10	Bulk Density	0.88		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.56		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.48		%/weight	USEPA 3050 B
13	Zinc as Zn	41.74		mg/kg	USEPA 3050 B
14	Copper as Cu	37.2		mg/kg	USEPA 3050 B
15	Lead as Pb	1.38		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.07		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	BDL		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.53		mg/kg	USEPA 3050 B
19	Chromium as Cr	42.55		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.19		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Page 1 of 1

Report 43: Compost analysis (day 6) at NCL site (Rack 2/REC B6)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
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ENalyse*

Test Report REPORT NO- AB/NCL/11/2020-21/167

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/167
	Sample Name	REC – B – 6
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	09/11/2020
	Sample Received on Date	10/11/2020
	Analysis Date	10/11/2020 to 19/11/2020
	Reporting Date	20/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	98	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	6		
		<0.05mm	2		
4	pH	7.38		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	4.2		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.73		%/weight	IS 14684 1999, R.A. 2008
7	Moisture Content	18.8		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	28.87		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	16.68		--	By Calculation
10	Bulk Density	0.84		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.57		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.48		%/weight	USEPA 3050 B
13	Zinc as Zn	36.29		mg/kg	USEPA 3050 B
14	Copper as Cu	30.34		mg/kg	USEPA 3050 B
15	Lead as Pb	1.24		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.05		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	BDL		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.33		mg/kg	USEPA 3050 B
19	Chromium as Cr	39.31		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.16		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Page 1 of 1

Report 44: Compost analysis (day 9) at NCL site (Rack 2/REC B9)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/NCL/11/2020-21/168

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/168
	Sample Name	REC – B – 9
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	09/11/2020
	Sample Received on Date	10/11/2020
	Analysis Date	10/11/2020 to 19/11/2020
	Reporting Date	20/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	99	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	4		
		<0.05mm	1		
4	pH	7.5		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	4.1		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.78		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	17.8		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	28.50		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	15.97		--	By Calculation
10	Bulk Density	0.84		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.52		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.43		%/weight	USEPA 3050 B
13	Zinc as Zn	32.54		mg/kg	USEPA 3050 B
14	Copper as Cu	27.53		mg/kg	USEPA 3050 B
15	Lead as Pb	1.26		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.04		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	BDL		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.31		mg/kg	USEPA 3050 B
19	Chromium as Cr	34.22		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.18		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

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Report 45: Compost analysis (day 1) at NCL site (Rack 3/REC-C1)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/NCL/11/2020-21/45

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/45
	Sample Name	REC – C – 1
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	03/11/2020
	Sample Received on Date	04/11/2020
	Analysis Date	04/11/2020 to 09/11/2020
	Reporting Date	10/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	91	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	6		
		<0.05mm	2		
4	pH	6.7		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	3.8		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.43		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	23.0		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	25.90		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	18.15		--	By Calculation
10	Bulk Density	0.86		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.55		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.51		%/weight	USEPA 3050 B
13	Zinc as Zn	43.27		mg/kg	USEPA 3050 B
14	Copper as Cu	33.51		mg/kg	USEPA 3050 B
15	Lead as Pb	1.29		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.07		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	0.01		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.41		mg/kg	USEPA 3050 B
19	Chromium as Cr	43.52		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.29		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. PUNE

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Report 46: Compost analysis (day 3) at NCL site (Rack 3/REC-C3)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/NCL/11/2020-21/169

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/169
	Sample Name	REC – C –3
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	09/11/2020
	Sample Received on Date	10/11/2020
	Analysis Date	10/11/2020 to 19/11/2020
	Reporting Date	20/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	92	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	4		
		<0.05mm	2		
4	pH	7.3		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	3.9		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.92		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	22.37		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	31.14		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	16.21		--	By Calculation
10	Bulk Density	0.86		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.58		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.51		%/weight	USEPA 3050 B
13	Zinc as Zn	39.34		mg/kg	USEPA 3050 B
14	Copper as Cu	31.25		mg/kg	USEPA 3050 B
15	Lead as Pb	1.34		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.04		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	BDL		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.34		mg/kg	USEPA 3050 B
19	Chromium as Cr	41.35		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.25		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

Page 1 of 1

Report 47: Compost analysis (day 6) at NCL site (Rack 3/REC-C6)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/NCL/11/2020-21/165

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/165
	Sample Name	REC – C – 6
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	09/11/2020
	Sample Received on Date	10/11/2020
	Analysis Date	10/11/2020 to 19/11/2020
	Reporting Date	20/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result		Unit	Standard Method
1	Colour	Black		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour		--	APHA 23rd Edition
3	Particle Size	<4mm	94	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
		<0.5mm	4		
		<0.05mm	1		
4	pH	6.8		--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	4.2		dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.98		%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	21.48		%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	29.04		%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	14.73		--	By Calculation
10	Bulk Density	0.84		gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.48		%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.49		%/weight	USEPA 3050 B
13	Zinc as Zn	34.26		mg/kg	USEPA 3050 B
14	Copper as Cu	26.0		mg/kg	USEPA 3050 B
15	Lead as Pb	1.28		mg/kg	USEPA 3050 B
16	Mercury as Hg	0.06		mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	BDL		mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.32		mg/kg	USEPA 3050 B
19	Chromium as Cr	31.0		mg/kg	USEPA 3050 B
20	Nickel as Ni	1.07		mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

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Report 48: Compost analysis (day 9) at NCL site (Rack 3/REC-C9)

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
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CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report REPORT NO- AB/NCL/11/2020-21/172

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	Sample Code	AB/NCL/11/2020-21/172
	Sample Name	REC – C – 9
	Sample Collected By	Client
	Method for Sampling	--
	Sample Type	Compost
	Sample Collected On	09/11/2020
	Sample Received on Date	10/11/2020
	Analysis Date	10/11/2020 to 19/11/2020
	Reporting Date	20/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting	

Sr. No.	Parameter	Result	Unit	Standard Method
1	Colour	Black	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
2	Odour	Absence Of Foul Odour	--	APHA 23rd Edition
3	Particle Size	<4mm 95 <0.5mm 4 <0.05mm 1	%	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
4	pH	7.12	--	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
5	Electrical Conductivity	3.6	dS/m	C.A. Black, American Society of Agronomy 5th Edition, 65-15800
6	Total Kjeldhal Nitrogen	1.49	%/weight	IS 14684 1999,R.A. 2008
7	Moisture Content	18.89	%/weight	IS 2720 (Part 2):1973 (Reaffirmed 2004)
8	Total Organic Carbon	23.62	%/weight	C.A. Black, American Society of Agronomy 5th Edition, 65
9	C:N Ratio	15.89	--	By Calculation
10	Bulk Density	0.82	gm/cc	C.A. Black, American Society of Agronomy 5th Edition, 65
11	Potassium as K_2O	0.51	%/weight	USEPA 3050 B
12	Phosphate as P_2O_5	0.45	%/weight	USEPA 3050 B
13	Zinc as Zn	42.23	mg/kg	USEPA 3050 B
14	Copper as Cu	33.34	mg/kg	USEPA 3050 B
15	Lead as Pb	1.21	mg/kg	USEPA 3050 B
16	Mercury as Hg	0.04	mg/kg	USEPA 3050 B
17	Arsenic as As_2O_3	0.01	mg/kg	USEPA 3050 B
18	Cadmium as Cd	0.39	mg/kg	USEPA 3050 B
19	Chromium as Cr	46.59	mg/kg	USEPA 3050 B
20	Nickel as Ni	1.32	mg/kg	USEPA 3050 B

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. * PUNE *

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Council of Scientific and Industrial Research
National Chemical Laboratory

Report 49: Air quality analysis of Exhaust from GOWC machine tested at NCL site

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Indoor Air Quality Monitoring Report Report No.AB/NCL/10/2020-21/861

Client Details Name & Address:		
Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pashan, Pune 411008.	Sample Code	AB/NCL/10/2020-21/861
	Sample Location	Compost Plant-Near Ecoman Compost M/c
	Sample Collected By	Aavanira Biotech Pvt. Ltd.,
	Sample type	Workzone Air
	Method of Sampling	As per IS : 5182 Part 1 (2006)
	Date of Sampling	27/10/2020
	Time of Sampling	11:00 am.
	Sampling Duration	01 Hrs.
	Shop Temperature	31.5°C
	Dry Bulb & Wet Bulb Temp.	31.2°C / 22.5°C
	Relative Humidity(RH)	45 %
	Analysis Date	28/10/2020 to 31/10/2020
	Reporting date	31/10/2020
	Instrument Details	Portable Gas Sampler, AB/Tech/Instr/138
Sample returned /stored	Stored at 4°C for 1 week from the date of sampling	

TEST PARAMETERS

Sr. No.	Parameter	Result	Unit	The Factories Act 1948, Standards	Standard Method
1	Sulphur Dioxide (SO_2)	2.15	mg/m^3	< 5	NIOSH METHOD: 6400, Issue 2
2	Nitrogen Dioxide (NO_2)	1.96	mg/m^3	<6	NIOSH METHOD: 6014, Issue 2
3	Ammonia (NH_3)	8.65	mg/m^3	<18	NIOSH METHOD: 6015, Issue 2
4	Hydrogen Sulphide (H_2S)	4.2	mg/m^3	<14	NIOSH METHOD: 6013, Issue 1
5	Carbon Monoxide(CO)	2.5	mg/m^3	<55	NIOSH METHOD: 6603
6	Methane (CH_4)	18.0	mg/m^3	<656 (NIOSH)	NIOSH 1985b
7	Carbon Dioxide(CO_2)	0.20	%	<0.5 (NIOSH)	NIOSH METHOD: 6603

REMARKS / OBSERVATIONS:

- All above results are within The Factories Act, 1948 Standards.

Verified By – Quality Manager

Authorized By – Technical Manager / Dy. Technical Manager

Govt. Analyst

-----End of Report-----

AAVANIRA BIOTECH (P) LTD. PUNE

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Report 50: Water quality analysis of Exhaust from GOWC machine tested at NCL site

Aavanira Biotech (P) Ltd. Kinetic Innovation Park, D-1 Block, Plot No. - 18/1 Part,
MIDC Chinchwad, Pune - 411 019. Maharashtra, India.
■ Tel.: 8308805200 / 8446000118, ■ E-mail : info@aavanira.com, ■ Web : www.aavanira.com
CIN NO. U74900PN2010PTC137544

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ENalyse*

Test Report — REPORT NO- AB/NCL/11/2020-21/49

Client Details Name & Address: Dr. Mahesh S. Dharne (Senior Scientist and Head) National Collection of Industrial Microorganisms (NCIM) CSIR- National Chemical Laboratory Pune 411008, Maharashtra, India	
Sample Code	AB/NCL/11/2020-21/49
Sample Name	REC – W - 1
Sample Collected By	Client
Method for Sampling	--
Sample Type	Water Sample
Sample Collected On	03/11/2020
Sample Received on Date	04/11/2020
Analysis Date	04/11/2020 to 09/11/2020
Reporting Date	10/11/2020
Sample returned /stored	Stored at 4°C for 1 week from the date of reporting

Sr. No.	Parameter	Results	Units	Standard Method
1.	Colour	5.0	Hazen Units	IS: 3025 Part-04 (R.A : 2002)
2.	Odour	Agreeable	--	IS: 3025 Part-05 (R.A : 2002)
3.	TDS (Total Dissolved Solids)	242.0	mg/lit	IS: 3025 Part-16 (R.A : 2006)
4.	pH (at 25°C)	7.21	--	IS: 3025 Part-11 (R.A : 2002)
5.	E Conductivity	442.2	µS/cm	IS: 3025 Part-14 (R.A : 2002)
6.	Total Hardness (as $CaCO_3$)	45.83	mg/lit	IS: 3025 Part-21 (2009)
7.	Chloride (as Cl^-)	9.61	mg/lit	IS: 3025 Part-32 (R.A : 2003)
8.	Sulphate (as SO_4^{-2})	8.70	mg/lit	APHA :23rd edition -(4500- SO_4^{2-} E)
9.	Nitrate (as NO_3^{-2})	1.01	mg/lit	APHA :23rd edition -(4500-NO_3^{2-} B)
10.	Fluorides (as F^-)	0.45	mg/lit	APHA :23rd edition -(4500-F^- F)
11.	Detergent	1.14	mg/lit	APHA :23rd edition -(5540 C)
12.	Cyanide (as CN^-)	BDL	mg/lit	Cl. 2 of IS 3025 (Part 27)
13.	Total Ammonia (as N)	1.5	mg/lit	APHA :23rd edition -(4500-NH_3B and C)
14.	Phenolic Compound (as phenol)	0.05	mg/lit	IS: 3025 Part-43 (R.A : 2003)
15.	BOD	120.0	mg/lit	IS: 3025 Part-44 (R.A : 2003)
16.	COD	472.10	mg/lit	IS: 3025 Part-58 (R.A : 2006)
17.	Dissolved Oxygen	3.2	mg/lit	IS: 3025 Part-38 (1989)
18.	Hexa Chromium	0.21	mg/lit	APHA :23rd edition ,3500 Cr B
19.	Ca Hardness	33.30	mg/lit	IS: 3025 Part-21 (2009)
20.	Mg Hardness	12.50	mg/lit	IS: 3025 Part-21 (2009)
21.	Arsenic (as As)	0.006	mg/lit	IS: 3025 Part-02 (2004)
22.	Boron (as B)	BDL	mg/lit	IS: 3025 Part-02 (2004)
23.	Cadmium (as Cd)	0.001	mg/lit	IS: 3025 Part-02 (2004)
24.	Mercury (as Hg)	0.04	mg/lit	IS: 3025 Part-02 (2004)
25.	Lead (as Pb)	0.01	mg/lit	IS: 3025 Part-02 (2004)
26.	Selenium (as Se)	0.003	mg/lit	IS: 3025 Part-02 (2004)
27.	Copper (as Cu)	0.21	mg/lit	IS: 3025 Part-02 (2004)
28.	Manganese (as Mn)	0.16	mg/lit	IS: 3025 Part-02 (2004)
29.	Zinc (as Zn)	0.69	mg/lit	IS: 3025 Part-02 (2004)
30.	Barium (as Ba)	0.10	mg/lit	IS: 3025 Part-02 (2004)
31.	Iron as Fe	0.90	mg/lit	IS: 3025 Part-02 (2004)
32.	Total Coliform	1600	MPN/100ml	IS: 1622 (R.A : 2014)
33.	Sodium Absorption Ratio	NIL	--	--

BDL- Below Detection Limit,

Verified By – Quality Manager

Govt. Analyst

Authorized By – Technical Manager / Dy. Technical Manager

-----End of Report-----

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