Dhirubhai Ambani
Institute of Information and Communication Technology

DA-IICT Road, Gandhinagar, Gujarat, India 382007.
Tel.:+91 79 6826 1700 I Fax: +91 79 6826 1710 I Web: www.daiict.ac.in

NAAC Accreditation Grade 'A'
Recipient of Centre of Excellence Award by the Government of Gujarat

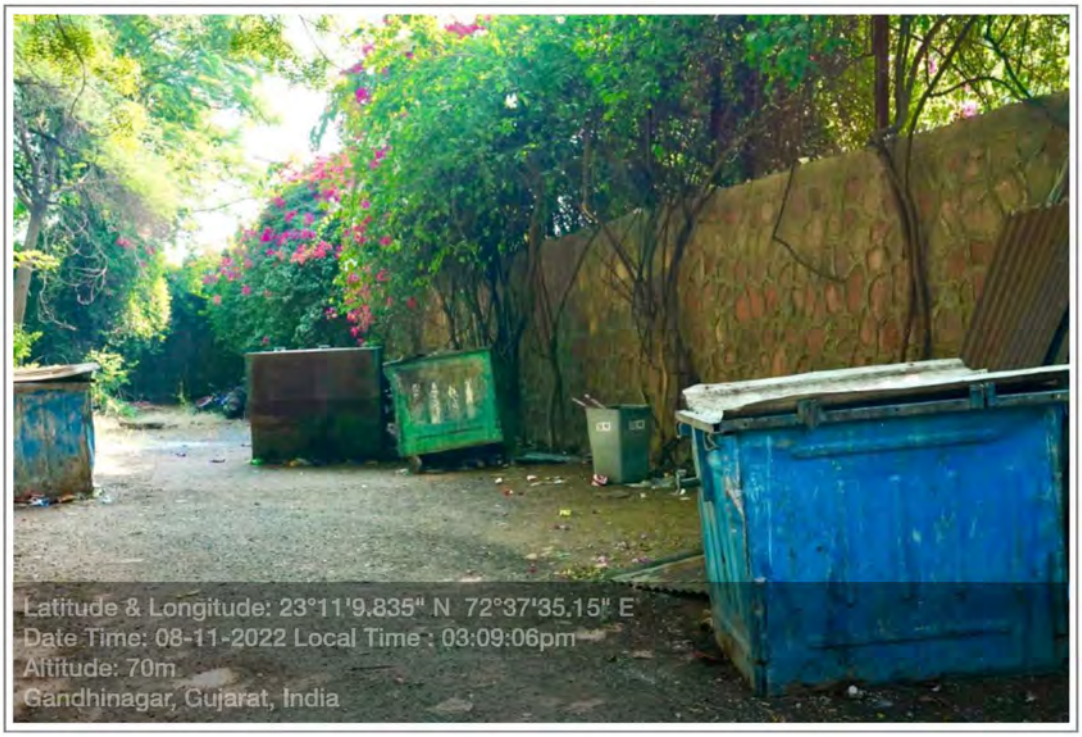
7.1.3 Describe the facilities in the Institution for the management of the following types of degradable and non-degradable waste

Dhirubhai Ambani
Institute of Information and Communication Technology
Gandhinagar - 382 007, Gujarat (India)

ENGINEERS WITH
SOCIAL RESPONSIBILITY

Geotagged Photographs of the Campus

Solid Waste Management



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STP

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Waste Water Recycling

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Waste Water Recycling

An ISO 9001, 14001 & 45001 Certified Organization

GUJARAT GREEN RECYCLING

Certificate of Environment Friendly Processing

This is to certify the Acceptance and Processing in compliance with the Guidelines approved by the concerned Authorities, for the material as per the enclosed document received from

DA-IICT
WEIGHT-500 KG

Date: **03/12/2022**

Sign: चुन्नीलाल

Plot No. 500, MSME Park, SANAND GIDC II, Ahmedabad, Gujarat 382170
www.GujaratGreenRecycling.com | GGR.Sanand@Gmail.com | +91 898 00 90 317

GPCB

GUJARAT POLLUTION CONTROL BOARD
PARYAVARAN BHAVAN
Sector-10-A, **Gandhinagar**-382 010
Phone : (079) 23226295
Fax : (079) 23232156
Website : www.gpcb.gov.in

R.P.A.D

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 3(c) & 5(5) of the Hazardous Waste (Management, Handling & Trans Boundary Movement) Rules-2016 framed under the Environmental (Protection) Act-1986.

And whereas Board has received consolidated consent application No. **208738** dated **28/12/2021** for of the Consolidated Consent and Authorization (CC & A) of this Board under the provisions/rules of the aforesaid Acts. Consents & Authorization are hereby granted as under:

CONSENTS AND AUTHORISATION:
(Under the provisions /rules of the aforesaid environmental acts)

To:
M/s. Gujarat Green Recycling,
Plot No. MSME-500, Sanand-II,
Engineering Industrial Estate,
GIDC Sanand-II, Sanand-382110,
Tal: Sanand, Dist: Ahmedabad.

1. **Consent Order No. AWH-117917 date of Issue: 01/04/2022.**

1.1. The consents shall be valid up to **30/09/2026** for use of outlet for the discharge of trade effluent & emission due to operation of industrial plant for manufacturing of the following items/products:

Sr. No.	Product	Quantity
1	E-waste (Collection, Segregation, Transportation, Dismantling & Recycling)	375 MT/Year
2	Cable Recycling	12.5 MT/Month

2. **SPECIFIC CONDITION:**

2.1 Unit shall strictly maintain Zero Liquid Discharge condition.
2.2 Unit shall comply CPCB guideline for E-Waste recycling.
2.3 Unit shall comply with conditions mentioned in Passbook.

3. CONDITIONS UNDER THE WATER ACT:

3.1 The water consumption and waste water generation shall be read as under.

	Water Consumption	Waste water generation
Industrial	Nil	Nil
Domestic	1.5 KL/Day	1.2 KL/Day

3.2 The quantity of domestic effluent shall not exceed 1.2 KL/Day.

3.3 Domestic waste water shall be dispose off through soak pit/septic tank system.

4. CONDITIONS UNDER THE AIR ACT:

4.1 There shall be no flue gas emission.

4.2 The applicant shall install & operate air pollution control system in order to achieve norms prescribed below.

4.3 The Process gas emission through stack mentioned below shall conform to the following standards:

Stack No.	Stack attached to	Stack height in meter	Air Pollution Control system	Parameter	Permissible Limit
1	Dismantling/ De dusting stack on the top shredder	12 m	Bag filter	Particulate Matter	150 mg/NM3

4.4 Stack monitoring facility like port hole, platform/ladder etc., shall be provided with stacks/vents chimney in order to facilitate sampling of gases being emitted into the atmosphere.

4.5 The concentration of the following parameters in the ambient air within the premises of the industry shall not exceed the limits specified hereunder:

PARAMETERS	PERMISSIBLELIMIT	
	Annual	24 Hrs Average
Particulate Matter-10 (PM_{10})	60 Microgram/M^3	100 Microgram/M^3
Particulate Matter- 2.5 ($PM_{2.5}$)	40 Microgram/M^3	60 Microgram/M^3
SO_2	50 Microgram/M^3	80 Microgram/M^3
NO_x	40 Microgram/M^3	80 Microgram/M^3

4.6 The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75 dB(a) during day time and 70 dB (A) during night time. Daytime is reckoned in between 6 a.m. and10 p.m. and nighttime is reckoned between 10 p.m. and 6 a.m.

GPCB

GUJARAT POLLUTION CONTROL BOARD
PARYAVARAN BHAVAN
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Phone : (079) 23226295
Fax : (079) 23232156
Website : www.gpcb.gov.in

5. **GENERAL CONDITIONS: -**

5.1 Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.

5.2 Whenever due to accident or other unforeseen act or ever, such emissions occur or is apprehended to occur in excess of standards laid down such information shall be forthwith reported to Board, concerned Police Station, Office of Directorate of Health Service, Department of Explosives, Inspectorate of Factories and local body. In case of failure of pollution control equipment, the production process connected to it shall be stopped. Remedial actions/measures shall be implemented immediately to bring entire situation normal.

5.3 The Environmental Management Unit/Cell shall be setup to ensure implementation on and monitoring of environmental safeguards and other conditions stipulated by statutory authorities.

5.4 The Environmental Management Cell/Unit shall directly report to the Chief Executive of the organization and shall work as a focal point for internalizing environmental issues. These cells/units also coordinate the exercise of environmental audit and preparation of environmental statements.

5.5 The Environmental audit shall be carried out yearly and the environmental statements pertaining to the previous year shall be submitting to this State Board latest by 30th September every year.

5.6 The Board reserves the right to review and/or revoke the consent and/or make variations in the conditions, which the Board deems, fit in accordance with Section 27 of the Act.

5.7 In case of change of ownership/management the name and address of the new owners/partners/ directors/proprietor should immediately be intimated to the Board.

6. **Authorization for the Management & Handling of Hazardous Wastes Form-2 (See rule (See rule 6 (2)):**

6.1 **M/s. Gujarat Green Recycling,** is hereby granted an authorization to operate facility for following Hazardous wastes on the premises situated **Plot. No. MSME-500, Sanand-II, Engineering Industrial Estate, GIDC Sanand-II, Sanand-382110, 6Tal: Sanand, Dist: Ahmedabad.**

Sr. NO	Waste Used	Category	Quantity	Facility
1	Used oil	I-5.1	50 Lit/ Year	Collection, storage and reused as lubricant within premises.

2	Discarded containers/ Drums/ Liners/ bags	I-33.3	100 Nos./ Year	Collection, Storage, Transportation, Disposal by Selling to authorized recycler having valid CCA of GPCB & Rule-9 permission under HWM Rule-2016 by use of GPS enable vehicle and xgn generated manifest.
3	Dust from bag filter	--	0.100 MT/Year	Collection, Storage, Transportation and Disposal at TSDF. by use of GPS enable vehicle and xgn generated manifest.
4	Phosphorus powder/ Crushed lamps/ Glass phosphor	--	0.5 MT/Year	Collection, Storage, Transportation and Disposal at TSDF. by use of GPS enable vehicle and xgn generated manifest.

6.2 The authorization is granted to operate a facility for collection, storage, within factory premises, transportation and ultimate disposal of Hazardous wastes as above.

6.3 The authorization shall be in force for a period up to **30/09/2026.**

6.4 The authorization is subject to the conditions stated below and such other conditions as May be specified in the rules from time to time under the Environment (Protection) Act-1986.

7. TERMS AND CONDITIONS OF AUTHORISATION:

7.1 The applicant shall comply with the provisions of the Environment (Protection) Act - 1986 and the rules made there under.

7.2 The authorization shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board.

7.3 The persons authorized shall not rent, lend, sell, and transfer of otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board.

7.4 Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a breach of this authorization.

7.5 It is the duty of the authorized person to take prior permission of the Gujarat Pollution Control Board to close down the facility.

7.6 An application for the renewal of an authorization shall be made as laid down in rule 6(1).

GPCB

GUJARAT POLLUTION CONTROL BOARD
PARYAVARAN BHAVAN
Sector-10-A, **Gandhinagar**-382 010
Phone : (079) 23226295
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Website : www.gpcb.gov.in

7.7 Industry shall have to manage waste oil; discarded containers etc as per Amended Rules-2016 and shall apply Authorization/submit details for all applicable waste as per Amended Rules-2016 with 15 days.

7.8 Industry shall submit annual report within 15 days and sub subsequently by 30th June every year.

8. GENERAL CONDITIONS:

8.1 The waste generator shall be totally responsible for (i.e. collection, storage, , transportation and ultimate disposal) of the wastes generated.

8.2 Records of waste generation, its management and annual return shall be submitted to Gujarat Pollution Control Board in Form – 4 by 30th June of every year.

8.3 In case of any accident, details of the same shall be submitted in Form - II to Gujarat Pollution Control Board.

8.4 As per "Public Liability Insurance Act - 91 "company shall get Insurance Policy, if applicable.

8.5 Empty drums and containers of toxic and hazards material shall be treated as per guideline published for "Management & Handling of discarded containers". Records of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly.

8.6 In no case any kind of hazardous waste shall be imported without prior approval of appropriate authority.

8.7 In case of transport of hazardous wastes to a facility for (i.e. treatment, storage and disposal) existing in a State other than the State where hazardous wastes are generated, the occupier shall obtain 'No Objection Certificate' from the State Pollution Control Board or Committee of the concerned State or Union territory Administration where the facility exists.

8.8 Unit shall take all concrete measures to show tangible results in waste generation, reduction, avoidance, reuse and recycle. Action taken in this regards shall be submitted within three months and also along with Form-4.

8.9 Industry shall have to display the relevant information with regard to hazardous waste, waste water & air pollutants as indicated in the Courts Order in W.P. No.657 of 1995-dated 14th October-2003.

8.10 Industry shall have to display on-line data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including waste water and air emissions and solid hazardous wastes generated within the factory premise.

DP Shah

8.11 If it is established by any competent authority that the damage is caused due to their industrial activities to any person or his property in that case they are obliged to pay the compensation as determined by the competent authority.

For and on behalf of
Gujarat Pollution Control Board

DPShah

(Smt. D. P. Shah)
Senior Environment Engineer

NO.GPCB/CCA-ABD-GEN-1847/71870/ **Dt.**

Issued to:
M/s. Gujarat Green Recycling,
Plot No. MSME-500, Sanand-II,
Engineering Industrial Estate,
GIDC Sanand-II,
Sanand-382210,
Tal: Sanand, Dist: Ahmedabad.

Tax Invoice

DA-IICT Near Indroda Circle, Gandhinagar.Gujarat India 382007 GSTIN/UIN: 24AAAJT1203A1ZZ State Name : Gujarat, Code : 24 E-Mail : info@daiict.ac.in	Invoice No. **DAIICT/22-23/218**	Dated **20-Oct-2022**
	Delivery Note	Mode/Terms of Payment
	Supplier's Ref.	Other Reference(s)
Buyer **Gujarat Green Recycling** Plot No. 500, Msme Park, Sanand Gidc - Ii, Ahmedabad - Gujarat -- 382170 M 8980090317 GSTIN/UIN : 24BQEPG9612B2ZA PAN/IT No : BQEPG9612B State Name : Gujarat, Code : 24	Buyer's Order No.	Dated
	Despatch Document No.	Delivery Note Date
	Despatched through	Destination
	Terms of Delivery	

Sl No.	Particulars	HSN/SAC	Quantity	Rate	per	Amount
1	**Scrap- Computer @ 18%** *1 Lot Coumputer Scrap*	84713090				**14,543.22**
2	**SGST PAYABLE**					**1,308.89**
3	**CGST PAYABLE**					**1,308.89**
	Total					**₹ 17,161.00**

Amount Chargeable (in words) *E. & O.E*

Indian Rupees Seventeen Thousand One Hundred Sixty One Only

HSN/SAC	Taxable Value	Central Tax		State Tax		Total Tax Amount
		Rate	Amount	Rate	Amount	
84713090	14,543.22	9%	1,308.89	9%	1,308.89	2,617.78
Total	**14,543.22**		**1,308.89**		**1,308.89**	**2,617.78**

Tax Amount (in words) : **Indian Rupees Two Thousand Six Hundred Seventeen and Seventy Eight paise Only**

Remarks:
BEING THE AMT. OF SALE SCRAP OF DESKTOP, MONITORS, LAPTOPS, NETWORK SWITCH, SCANNER & RELATED TO COMPUTERS TO GUJARAT GREEN RECYCLING

Company's PAN : **AAAJT1203A**

Company's Bank Details
Bank Name : **Bank ICICI A/c 016501013975**
A/c No. : **016501013975**
Branch & IFS Code : **Gandhinagar & ICIC0000165**

for DA-IICT

Authorised Signatory

SUBJECT TO GANDHINAGAR JURISDICTION

This is a Computer Generated Invoice

Gandhinagar Municipal Corporation

Gandhinagar Mahanagar Seva Sadan First Floor, M. S. Building, Nr. Family Court,
Sector-11, Gandhinagar-382011

Tel No.: (079) 23220440, Fax No.: (079) 23221419
email : gmc8gandhinagar@gmail.com web site : http://www.gandhinagarmunicipal.com/

Letter no. 9489 Date: 07/08/ 2020

To

Assistant Admin Officer,
Dhirubhai Ambani Institute of Information and Communication Technology (DAIICT),
DAIICT-campus, Reliance Cross Rd, Gandhinagar, Gujarat 382007

Subject : Acknowledgment of Solid Waste Management practices in DAIICT campus

Reference : 1.Your Email dated 15.07.2020

This is in reference to your email dated 15-07-2020 requesting for a certificate on the practice of "Solid Waste Management" in DAIICT campus for the application of Centre of Excellence.

We hereby confirm that, DAIICT is notified as Bulk Waste Generator by Gandhinagar Municipal Corporation (GMC) under SWM Rules 2016. In compliance to SWM Rules 2016, DAIICT has been practicing the onsite processing of the waste by establishing the following plants in their campus:

1. **Vermicompost plant** - processing of organic waste
2. **Organic Waste Converter** – mechanised processing of organic waste

We also confirm that GMC has been providing solid waste collection services to DAIICT campus on daily basis.

We look forward for your continuous support in conserving the environment through better waste management practices and also convey our best wishes to your organisation.

Deputy Municipal Commissioner
Gandhinagar Municipal Corporation

Copy to

1. Respected Municipal Commissioner, GMC (for information)

Dhirubhai Ambani
Institute of Information and Communication Technology
Gandhinagar - 382 007, Gujarat (India)

Engineers with
social responsibility

Geotagged Photographs of the Campus

43 - Vermicompost Site

Dhirubhai Ambani Institute Of Information And Communication Technology (DA-IICT)

SEWAGE TREATMENT PLANT OF DA-IICT (STP)

Submitted By:

Shah Sneha

Agarwal Ashish

Choubisa Himanshu

Gupta Apurv

Acknowledgement

We would like to express profound gratitude to our guide Prof. Shweta Rao Garg for his invaluable support, encouragement, supervision and useful suggestions throughout this project work. Her moral support and continuous guidance enabled us to complete the work successfully.

We are grateful for the cooperation and constant encouragement from the honorable Sir Rajesh Patel. His suggestions and the ideas made our work easy and proficient.

We wish to express our appreciation to Prof. Ranendu Ghosh who helped us to overcome from our dough in doing this report.

Last but not the least, We are thankful and indebted to all those who helped us directly or indirectly in completion of this project report.

Shah Sneha
Agarwal Ashish
Choubisa Himanshu
Gupta Apurv

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Introduction

The DA-IICT was established in Gandhinagar in 2001. The architecture of DA-IICT is functional, but what surrounds it is a fascinating garden. The entire design was oriented to "Preserving the Environment".

To reuse the waste water,the STP Plant at DA-IICT was established in 2005.After recycling the waste water,The filter water is used in garden and fountain.

Pollution in the Gandhinagar is the broadest sense includes all changes that curtail natural utility and exert deleterious effect on life of people at DA-IICT. The crisis triggered by the rapidly growing population with the resultant degradation of the environment causes a grave threat to the quality of life.

Degradation of water quality is the unfavorable alteration of the physical, chemical and biological properties of water that prevents domestic, commercial, industrial, agricultural, recreational and other beneficial uses of water. Sewage and sewage effluents are the major sources of water pollution. Sewage is mainly composed of human fecal material, domestic wastes including wash-water and industrial wastes.

The growing environmental pollution in Gandhinagar needs for decontaminating waste water result in the study of characterization of waste water, especially domestic sewage. In the past, domestic waste water treatment was mainly confined to organic carbon removal. Recently, increasing pollution in the waste water leads to developing and implementing new treatment techniques to control waste water and other priority pollutants at DA-IICT that is Sewage Treatment Plant.

Requirement of Sewage Treatment Plant at DAIICT

Sewage treatment is the process of removing contaminants from wastewater, primarily from household sewage. It includes physical, chemical, and biological processes to remove these contaminants and produce environmentally safe treated wastewater (or treated effluent.

The term "Sewage Treatment Plant" (or "sewage treatment works" in some countries) is nowadays often replaced with the term "wastewater treatment plant"

Sewage Treatment Plants (STPs) are proposed to DA-IICT :-

1) To make for recycling and reuse for gardens and fountain uses and for planting purpose and also to minimize the environmental and health impacts of the sewage.

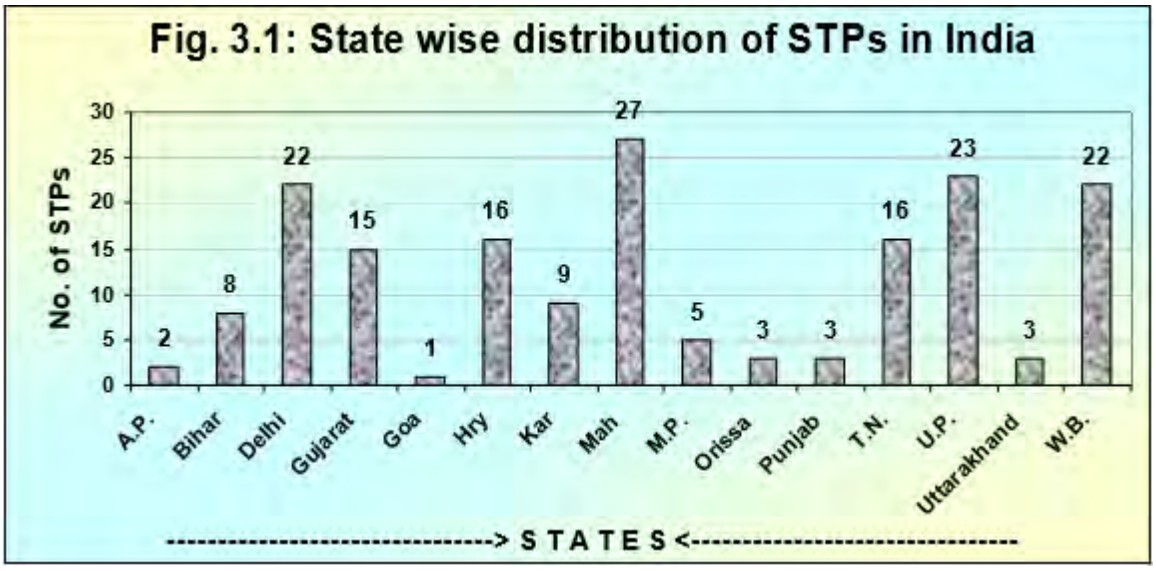
2) Treating wastewater has the aim to produce an effluent that will do as little harm as possible when discharged to the surrounding environment, thereby preventing pollution compared to releasing untreated wastewater into the environment

(Image From-Google Earth)

At DA-IICT, the Sewage Treatment Plant was installed in 2003

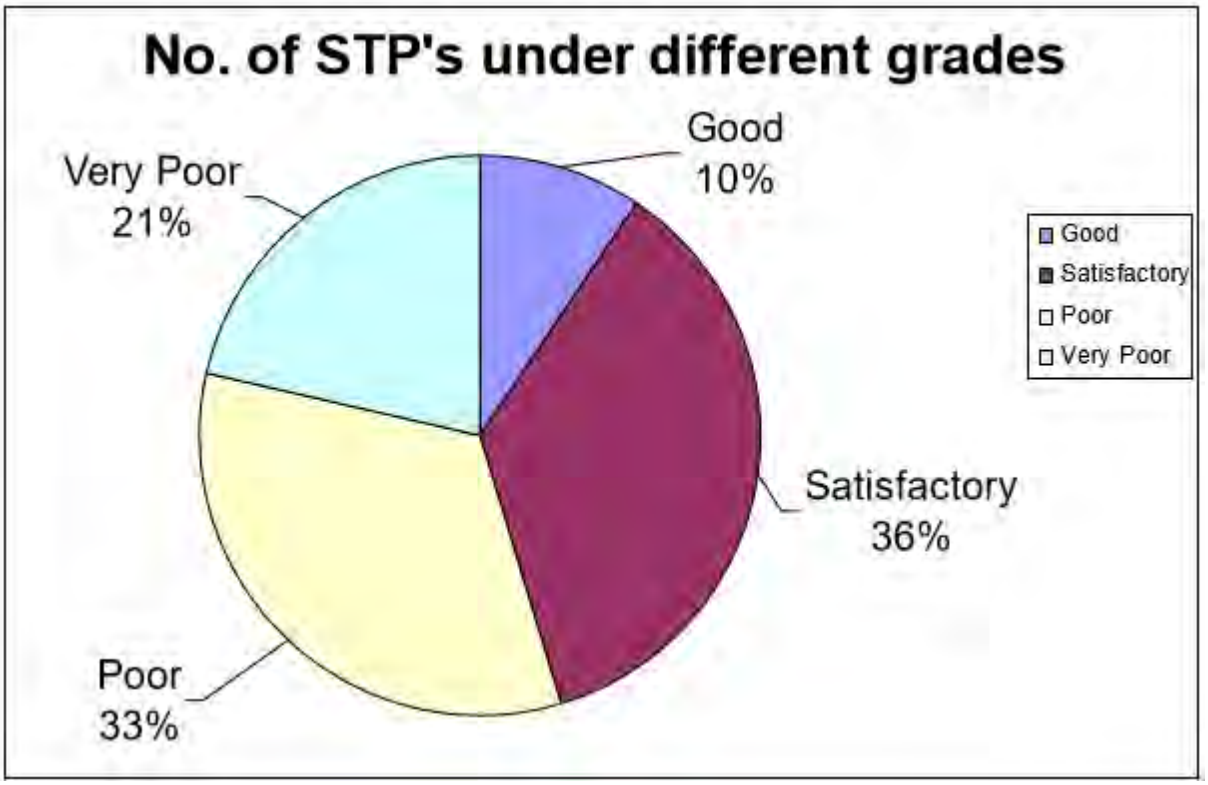
Literature Survey of India

The study brought out large number of technological & managerial problems in operation of these STPs. Out of 175 total identified STPs spread over 15 States , the present report has included only 84 STPs of 13 different technologies spread over 9 States of India . Information in the prescribed format has been received for 79 STPs from different agencies . The overall performance of 45 STPs has been found poor or very poor. Out of 84, performance of only 8 STPs has been rated good, while that of 30 of these have been rated satisfactory . Capacity utilization in general was inadequate. Sludge handing appears to be most neglected area in STPs operation. Alternate power supply facility is not available in most of the cases. Utilization of biogas generated from UASB reactors or sludge digesters is also not adequate in most of the cases. In this Chapter, an attempt has been made to bring out the facts on technological and managerial problems in operation of the STPs in India



[Images taken from the central pollution control board]

Performance rating of STPs visited in India



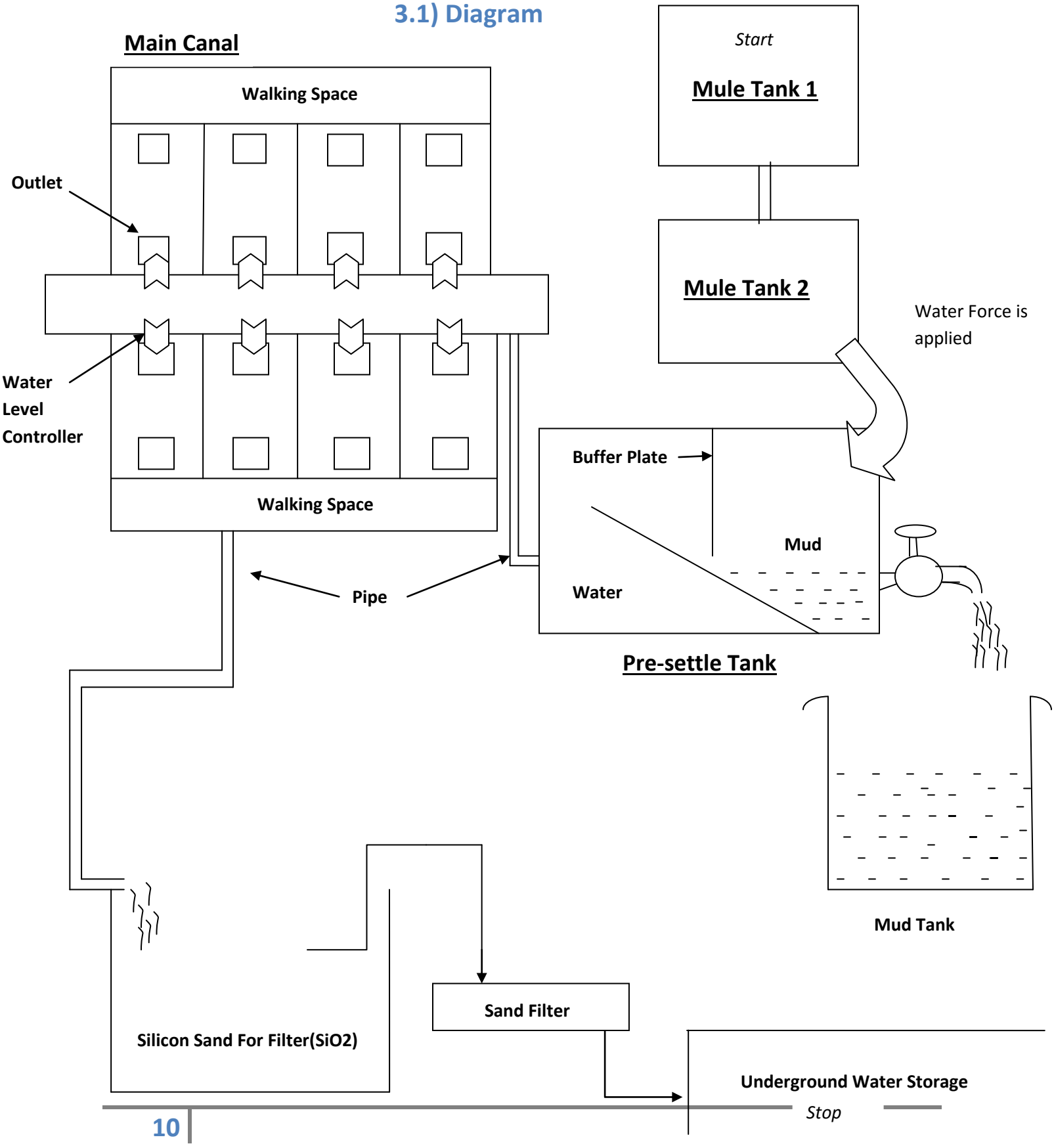
[Images taken from the central pollution control board]

Total scenario of STPs performance is dismal, as overall performance of 46 STPs has been found Poor or Very Poor. Performance of only 8 STPs has been rated Good while that of 30 other has been rated Satisfactory.

Analysis Techniques

(Methodology)

3.1) Diagram


Main Canal
Walking Space
Outlet
Water
Level
Controller
Walking Space
Start
Mule Tank 1
Mule Tank 2
Water Force is applied
Buffer Plate
Mud
Water
Pipe
Pre-settle Tank
Mud Tank
Sand Filter
Silicon Sand For Filter(SiO2)
Underground Water Storage
Stop

3.2 Sewage treatment at DA-IICT generally involves three stages :-

1) Primary Treatment

2) Secondary Treatment

3) Tertiary Treatment.

1) Primary treatment

It consists of temporarily holding the sewage in a mule tank where heavy solids can settle to the bottom while oil, grease and lighter solids float to the surface. The settled and floating materials are removed and the remaining liquid may be discharged or subjected to secondary treatment. Some sewage treatment plants that are connected to a combined sewer system have a bypass arrangement after the primary treatment unit. This means that during very heavy rainfall events, the secondary and tertiary treatment systems can be bypassed to protect them from hydraulic overloading , and the mixture of sewage and storm water only receives primary treatment.

Mule Tank of DA-IICT

This is the Mule tank of DA-IICT where the water which have to be recycle is store over here. It is primary stage of the sewage treatment plant.

2) Secondary treatment

It removes dissolved and suspended biological matter. Secondary treatment is typically performed by indigenous, water-borne micro-organisms in a managed habitat. Secondary treatment may require a separation process to remove the micro-organisms from the treated water prior to discharge or tertiary treatment.

Pre-settle Tank in DA-IICT

Filtering at DA-IICT

Pre-settle Tank – In DA-IICT, the task for this tank is to clean the water and take out the sludge from the water and move to further process of cleaning it.

Filtering – This is also at the secondary treatment where the water is again filtered which is come from the Pre-settle tank.

3) Tertiary treatment

It is sometimes defined as anything more than primary and secondary treatment in order to allow rejection into a highly sensitive or fragile ecosystem Treated water is sometimes disinfected chemically or physically (for example, by lagoons and microfiltration) prior to discharge into a river, or it can be used for the irrigation of a garden. If it is sufficiently clean, it can also be used for groundwater recharge or agricultural purposes.

Silicon sand filter at DA-IICT

Silicon Sand Filter (SiO2)- It is the tertiary treatment in DA-IICT where the last process of recycling process is made. In this stage, the chemical named silicon sand is used to clean the water for the final time and to made that to use again.

3.3) Design considerations of DA-IICT

Following points are considered during the design of sewage treatment plant:

1. The design should not be done on the hourly sewage flow basis, but the average domestic flow basis.

2. Instead of providing one big unit for each treatment more than two numbers small units should provided, which will provide in operation as well as no stoppage during maintenance and repair of the plant.

3. Overflow weirs and the bypasses should be provided to cut the particular operation if desired.

4. Self cleaning velocity should develop at every place and stage.

5. The design of the treatment units should be economical; easy in maintenance should offer flexibility in operation.

Advantages of STP in DA-IICT

Saving of extra water

As the water is reuse again and again so due to that water saving is done. No requirement of extra water is made in the campus.

Recycling of water

Sewage treatment plant help in reuse the waste water which is the best method to save the water from being over use.

Ground water, surface water source is safe from pollution due to treatment of waste water

As the STP uses the groundwater again and again so due to that it is away from the other polluting sources like air pollution etc so it is easily filtered and can be reused.

Treated water is used for vegetation

As when the waste water is again reused so at that time the only purpose of that is to serve that water only for the vegetation purpose but not for the drinking purpose or daily use.

Cost of transportation of polluted water is saved

The STP helps in reusing the waste water so it saves the cost of the extra water with that it also decrease the transportation charges of that too.

Air pollution is limited to treatment plant

The process of the STP plant is done below the surface area so there is no direct contact made between the water and the air so it avoid the polluting the level of water as compared to vice versa.

Disadvantages of STP found in DA-IICT & Future improvements

Space

If there is exceeding of the area in the campus in future than there is another requirement of land which is a big thing and it increase the cost with that for the STP.

If the filtered water is stored for a long time than after a certain days the problems of bacteria, ammonia will start increasing.

As long as the recycled water is stored for a time , it start creating the bacteria ,ammonia as the recycled water cannot be hold for the long time.

Money is used for construction of waste water treatment

After establishing the STP plant is not that the work is complete, to maintain the STP plant with the regular maintainance is required which also need to invest money and it also increase the cost of the college.

Handling of dry sludge, cake

In the process of the STP, there a stage comes when it removes the sludge from the water so it is difficult to handle the sludge and to dispose it.

Food chain is missed for various organisms, life cycle river animals

As the water is been recycled again so at that time the food for the water organisms misses because the same water is recycled so the water organisms does not get food and because of that it cause death of the water organisms which is sometime necessary.

Conclusion

In the present study a scheme for the primary treatment and management of sewage generated in DA-IICT college has been developed. The total sewage generated in one day is 3.5ML. The treated water will be supplied for irrigating the gardens and trees which is at DA-IICT and the remaining sludge after treatment will be used as mud for other purposes. The use of treated water will reduce the ground water use and additionally the treated sludge will be very useful for increasing the fertility of soil. Important analysis of the STP have been designed for a specific case are:-

1) The design of primary sewage treatment is for the predicted population of 5,000 and estimated sewage of 3.5 MLD.

2) The capacity of the sewage treatment plant storage is it can serve over 4-5months continuously.

3) The Structure of the STP plant is made in such a way that it can cope up with additional 20% of the area then the current.

4) The construction of the primary sewage treatment plant will prevent the direct disposal of sewage in nearby river and the use of treated water will reduce the surface water and ground water contamination.

Bibliography

1)**[1]** https://en.wikipedia.org/wiki/**Sewage_treatment**

2) **[2]**http://www.cpcb.nic.in - CENTRAL POLLUTION CONTROL BOARD

3) Google Earth

Study on Vermicompost at DA-IICT

Dhirubhai Ambani Institute of Information and Communication Technology

Submitted By:

Drashti Trivedi

Ashvini Patel

Dilip Karnavat

Ritesh Upadhyay

Submitted To:

Prof. Ranedu Ghosh

Acknowledgement

We gratefully thank Prof. Ranedu Ghosh who inspired and motivated us to do the report work on vermicompost.

We want to thank Prof. Shweta Garg, who inspite of being busy with her duties took time out to hear and keep us on the correct path.

We want to thank Prof. Rajesh Patel for valuable guidance. We choose this moment to acknowledge his contribution gratefully.

Last but not the least there were so many who shared valuable information that helped in the successful completion of the report writing.

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LIST OF FIGURES

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1. Introduction

We have studied on workings of vermicompost at DA-IICT. We have inquired why it is needed at DA-IICT campus, how it works.

In DA-IICT campus, almost 70% space is occupied by greenery. To maintain and to reuse the waste of horticulture products (plants and lawns) in proper way, the unit of vermicompost was established.

There were two options in front of the institute. Firstly use the horticulture waste to convert mechanically into electrical energy and Secondly to produce vermicompost. But there are many necessary things and rules which have to be followed in implementing such mechanical project which is unviable for the institute. So that the unit of vermicompost was implemented and all wastage of horticulture is reused by the process of vermicompost.

The process of vermicompost has been started in July, 2014.

“Vermicompost is the product of composting using various worms, usually red wigglers, white worms, and other earthworms to create a heterogeneous mixture of decomposing vegetable or food waste, bedding materials, and vermicast, also called worm castings, worm humus or worm manure, is the end-product of the breakdown of organic matter by an earthworm. These casting have been shown to contain reduced levels of contaminants and a higher saturation of nutrients than do organic materials before vermicomposting.

Containing water-soluble nutrients, vermicompost is an excellent, nutrient-rich organic fertilizer and soilconditioner.This process of producing vermicompost is called vermicomposting.”[1]

2. Literature Review

"The basics of Vermiculture" by Lewis & Andrew (2004). The major objective of study was to provide information on raising worms or Vermiculture [2]. In DA-IICT they use red worms to make vermicompost.

"Worms Experiment with Food Waste Diet" by Cornish, Phillip (1999). The major objective of study was to focus on the use of earthworm culture to combine with a composting system [3].

Anand Agricultural University used cow dung to make vermicompost. It also uses plant waste. In DA-IICT they use waste of plants to make vermicompost. This is further utilized as fertilizer.

Vermiculture Offers A New Agricultural Paradigm by Berc et al. (2004). The major objective of the studies was to report on the use of vermiculture to restore the health and productivity of agriculture in Cuba. Increase in production of vermicompost, uses of worm castings in Cuban crops, worm humus production. INSET: Profile of a Vermicompost Producer [4].

Just add worms by Kaldenbach, Robert (1994). The major objective of studied work suggests the use of earthworms in maintaining compost out of kitchen waste. Vermiculture, Worms ideal for compost, Anatomical structure of worms that make them suitable for converting waste to compost [5].

The home-built wormitorium by Yankee (1994). The major objective of studied work Offers suggestions on building and operating a habitat for worms called wormitorium that can be used to make compost out of kitchen waste [6].

3. Requirements of Vermicompost

Following are the top reasons why DA-IICT requires vermicompost.

- By vermicomposting, the amount of garbage send to the landfill can be reduced.
- Worms produce beautiful black compost called **"**castings**"**.
  It's a nitrogen rich fertilizer and it's not synthetic. Worm castings contain the microbes that help your plants access nutrients and create healthy soil. That's why it's one of the best soil additives on the planet. It is also used in ports as a fertilizer.
- It makes the environment healthier and vermicomposting deals with our waste in a clean and healthy way. It is used in horticulture and gardening purpose.

4. Methodology of vermicompost at DA-IICT

4.1 Materials for preparation of Vermicompost

Any types of biodegradable wastes-

1. Weed biomass
2. Leaf litter and plant waste
3. Vegetable waste/kitchen waste

4.2 Phase of vermicomposting

Phase1 : Processing involves collection of wastes, shredding, mechanical separation of the metal, glass and ceramics from it and storage of organic wastes.

Phase 2 : Pre digestion of organic waste for twenty days. This process partially digests the material and fit for earthworm consumption.

Phase 3 : Preparation of earthworm bed. A concrete base is required to put the waste for vermicompost preparation. Loose soil will allow the worms to go into soil and also while watering; all the dissolvable nutrients go into the soil along with water.

Phase 4 : Collection of earthworm after vermicompost collection. Sieving the composted material to separate fully composted material. The partially composted material will be again put into vermicompost bed.

Phase 5 : Storing the vermicompost in proper place to maintain moisture and allow the beneficial microorganisms to grow [7].

4.3 Vermicompost Production Methodology

i) Selection of suitable earthworm

For vermicompost production, the surface dwelling earthworm alone should be used. The earthworm, which lives below the soil, is not suitable for vermicompost production.

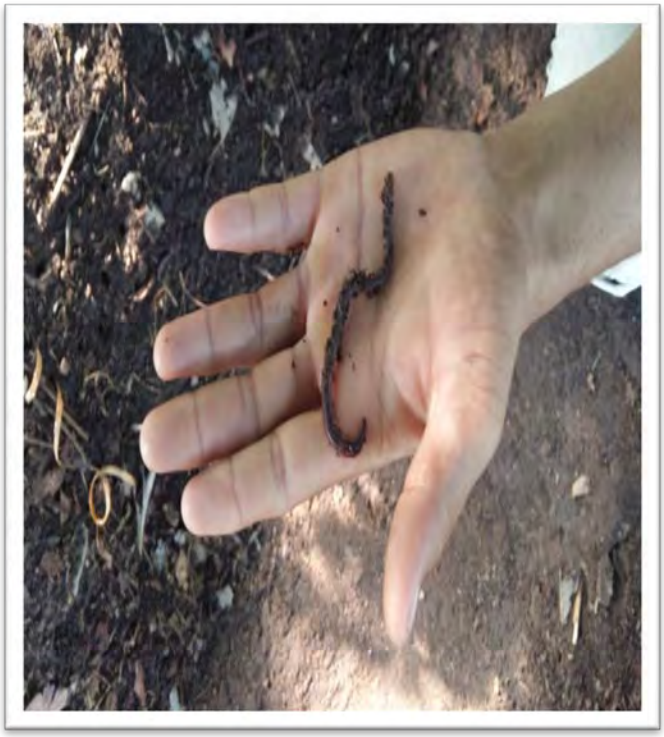

Fig. 4.3.1 The red worms are used at DA-IICT.

The African earthworm (*Eudrillus engenial),* Red worms (*Eisenia foetida)* and composting worm (*Peronyx excavatus)* are promising worms used for vermicompost production. The African worm (*Eudrillus eugenial)* is preferred over other two types, because it produces higher production of vermicompost in short period of time and younger ones in the composting period [7].

ii) Selection of site for vermicompost production

Vermicompost can be produced in any place with shade, high humidity and moderate temperature. If it is to be produced in open area, shady place is selected. It is also necessary that the place is less disturbed by peoples, animals, birds, ants and insects. A thatched roof or green nets may be provided to protect the process from direct sunlight and rain. The waste heaped for vermicompost production should be covered with moist gunny bags or with the grass wastes [7].

Fig. 4.3.2 Site 1 at DA-IICT

Fig. 4.3.3 Site 2 at DA-IICT

Fig. 4.3.4 Site 3 at DA-IICT

It is located behind the boy's hostel where there is shady area and less disturbance. It is protected from sunlight, birds and ants.

There are three sites of Vermicompost The sites are made up of grills so they are easily protected from birds and sunlight.

iii) Vermiculture bed

Vermiculture bed or worm bed (3 cm) can be prepared by placing after the leaf litter and grass wastes in the bottom of tub / container. Vermicompost beds are 2.5feet wide and length is as per the vermicompost size. The distance between beds is 2.5.A layer of fine sand (3 cm) should be spread over the culture bed followed by a layer of garden soil (3 cm). All layers must be moistened with water.

v) Selection for vermicompost production

Cattle dung (except pig, poultry and goat), farm wastes, crop residues, vegetable market waste, flower market waste and all other bio degradable waste are suitable for vermicompost production. The cattle dung should be dried in open sunlight before used for vermicompost production. All other waste should be predigested with cow dung for twenty days before put into vermibed for composting. In DA-IICT leaf litter, waste of horticulture (leaves/grass), weed biomass are used for vermicompost production [7].

vi) Watering the vermibed

Daily watering is not required for vermibed. But 60% moisture should be maintained throughout the period. If necessity arises, water should be sprinkled over the bed rather than pouring the water. Watering should be stopped 10-14 days before, the harvest of vermicompost [7].

vii) Harvesting vermicompost

Earthworms live in the soil and feed on decaying organic material. After digestion, the undigested material moves through the alimentary canal of the earthworm, a thin layer of oil is deposited on the castings. This layer erodes over a period of 2 months. The process in the alimentary canal of the earthworm transforms organic waste to natural fertilizer. The castings formed on the top layer are collected periodically. The collection may be carried out once in a week. With hand the casting will be scooped out and put in a shady place as heap like structure. The finished compost get compacted when watering is done [7].

Fig. 4.3.5"Castings" final product of vermicompost

The view where the vermicompost is located in DA-IICT

Fig. 4.3.6 Synoptic view of vermicompost site in DA-IICT

[Source: Google map]

Fig. 4.3.7 Zoomed view of vermicompost site in DA-IICT

[Source: Google map]

5. Advantages of Vermicompost at DA-IICT

- Vermicompost is rich in all essential plant nutrients.
- Provides excellent effect on overall plant growth encourages the growth of new shoots / leaves and improves the quality and shelf life of the produce.
- It recycles the waste of horticulture.
- It prevents nutrient losses and increases the use efficiency of chemical fertilizers.
- Vermicompost is free from pathogens, toxic elements, weed seeds etc.
- Vermicompost minimizes the incidence of pest and diseases.
- It enhances the decomposition of organic matter in soil.
- It contains valuable vitamins, enzymes and hormones like auxins, gibberellins etc.

6. Future Improvement

1. The more space can be occupied for the vermicompost unit as per the need as there is ample space in the location where it is located.
2. There is a huge amount of waste created which can be efficiently utilized for the unit.
3. Arrangement for the storage of the compost can be properly done which is not yet.
4. The students can be encouraged to take active part in the monitoring and working process of the unit and management of the unit.

7. References

1. Paper on Invasive European Worms. Retrieved 2009-02-22.

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