



Workshop on Pathogen Analysis Of Faecal Sludge

13-14th October, 2022

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13th & 14th October 2022

Birla Institute of Technology- Goa campus

Workshop Report

Center for Water and Sanitation CRDF, CEPT University

in partnership with

Birla Institute of Technology- Goa campus

1.1. INTRODUCTION

The Government of Maharashtra (GoM) has adopted systematic approach to implement city wide Faecal Sludge Management plans across the full sanitation service chain in the ULBs. It released a Government Resolution on 8th November 2019 to set up individual 311 Faecal Sludge Treatment Plants. At present 213 independent Faecal Sludge Treatment Plants are operational. Center for Water and Sanitation (CWAS) is the technical support unit to Government of Maharashtra for delivery of effective sanitation services across urban Maharashtra and the Swachh Maharashtra Mission.

With set up of many FSTPs, the characterization and testing of the septage and sludge is significant. In this context, CWAS in partnership with Birla Institute of Technology- Goa campus organized a two-day workshop on “Pathogen Analysis of Faecal Sludge” for laboratories and agriculture colleges. The training focused on pathogen and Helminth eggs testing of the sludge.

Pathogen analysis is a crucial part of faecal sludge management. Various pathogens are present in faecal sludge and can survive and infect humans if faecal sludge is not treated properly. First step in the treatment of pathogen is detection of pathogen for which different techniques are used. Coliform (Total and Faecal) along with other bacterial pathogens and Helminth eggs are mainly checked to ensure safe use of faecal sludge post treatment.

1.2. Objectives of Workshop

The principal objective was to develop the capacity of various laboratories in the state of Maharashtra in the context of pathogen analysis of the Faecal Sludge. It is expected that after completion of this two-day interactive hands-on workshop, the participants would able to detect and quantify pathogens from faecal sludge.

Learning Outcomes of the workshop

- Introduction to types of pathogens in faecal sludge
- Treatment technologies used for pathogen removal at BITS Goa
- Techniques used for pathogen analysis
- Analysis of pathogens from faecal sludge

Hands-on Training on

- Media and chemical preparation
- Bacterial pathogen (Total and faecal coliform, E.coli, Salmonella, Shigella, Vibrio) analysis by CFU method.
- Helminth eggs detection and quantification by modified AmBic method

1.3. Brief Overview of the Workshop

The laboratories in the state are well equipped to test the quality of untreated and treated wastewater. However, it is also important to test biosolids, i.e. sludge from STPs and FSTPs. Many laboratories in the state are not equipped to do so at present. In this context, CWAS in partnership with Birla Institute of Technology (BITS) at Goa campus has planned a two-day workshop on 13-14th October on faecal sludge testing training for laboratories and agriculture colleges in Maharashtra. This training will focus on pathogen and Helminth eggs testing of the sludge.

The workshop was conducted under the guidance of Dr. Shrikant Mutnuri, Professor, Dept. of Biological Science, BITS Pillani, Goa. The FSM laboratory at BITS Goa is well equipped and currently analyzing different types of samples for pathogen across India.

Opening Remarks

In the opening remarks, Dr. Mutnuri highlighted the importance of Pathogen analysis of faecal sludge for effective and safe reuse/end use practice in the Indian as well as international context. He mentioned about the initiative taken by the CWAS, CEPT University for this capacity building workshop along with the Biological Science dept. of BITS Pillani, Goa as well as the Global Sanitation Graduate School.

Workshop began with the pre-recorded videos on Faecal Sludge On-site Management, Faecal Sludge Treatment, Importance and awareness for detection of Pathogens in Faecal Sludge, etc. developed by EAWAG, Switzerland.

Overview of Bacterial Pathogen Analysis

This first day session covered the introduction to various pathogens and their detections methods as per the standard methods and hands on training on pathogen analysis. The following activities were covered under this session

- Media Preparation: Selective and Differential Media Preparation according the pathogen of interest.
- Sample Preparation: With Serial Dilution Method
- Spread Plating with sample of different dilutions
- CFU Calculation on next day with colonies count with theoretical calculations.

Figure 1: Photographs of Hands on Training on Bacterial Pathogen Analysis



Overview of Helminth analysis- Microscopy Method

The second day session covered the introduction of prevalence of infections in people living with rudimentary water followed by the laboratory testing methods introduction and hands on training on Helminth Eggs detection at laboratory. The following activities were covered under this session

- Helminth analysis- Chemical preparation
- Helminth analysis- Extraction of Helminth eggs from sample
- Helminth analysis- Microscopy

The laboratory testing of Helminth Eggs detections is based on four main principals; Washing, Filtration, Centrifugation and Flootation of Eggs to remove them from various waste media and examine & count every *Ascaris* Egg and classifying them as viable, potentially viable and dead.

Figure 2: Photographs of Hands on Training on Helminth analysis- Microscopy Method



1.4. Feedback and Way Forward

The response for this two-day interactive hands-on training sessions from all the participants was quite good. With the hands-on training, all the participants confirmed that they have learnt the testing process and will be able to conduct these tests at their laboratory. Though only Rahauri agriculture college has all the equipment readily available to conduct these tests, remaining laboratory will need to procure additional equipment like helminth sieve, culture, etc. The laboratories will be able to collect the samples across Maharashtra, but the samples will have to be delivered at the agriculture colleges to get it tested.

This training session was helpful in the capacity building of the participants and their future endeavour. The Helminths eggs hands-on training part of the session was the best course as per the feedback given by the participants. The regular training session's arrangements were requested from the participants to gain knowledge of new analysis methods and

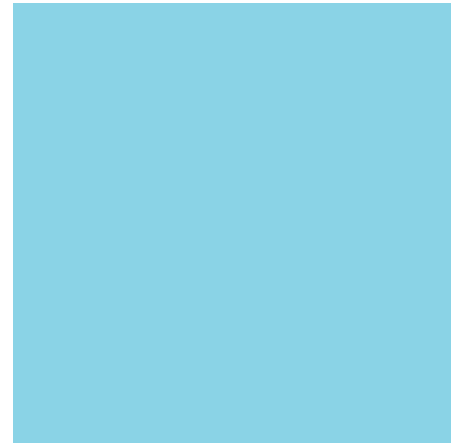
overall improvement in the accuracy of pathogen testing. It was also suggested to include the Pathogen Management Aspects in the next session.

Annexure 1: Workshop Agenda

13th October- Day 1- Bacterial Pathogen Analysis	
10:00-11:00 am	Introduction to workshop and lab visit
11:00-11:15 am	Tea break
11:15am-1:00pm	Bacterial pathogen analysis- Media and plate preparation
1:00-2:00pm	Lunch break
2:00-4:30pm	Bacterial pathogen analysis- Sample preparation and plating
4:30-5:00pm	Tea break
14th October- Day 2- Helminth Analysis	
10:00- 11:00am	Helminth analysis- Chemical preparation
11:00- 11:15am	Tea break
11:15am- 1:00pm	Helminth analysis- Extraction of Helminth eggs from sample
1:00-2:00pm	Lunch break
2:00-4:00pm	Helminth analysis- Microscopy
4:00- 4:30pm	Bacterial pathogen analysis- Colony counting
4:00- 5:00 pm	Closing Remarks

Annexure 2: List of Participants

Sr. No.	Name of Participant	Organization	Location
1	Mr. Harish Mendhi	Mahabal Enviro Engineers Pvt. Ltd.	Nagpur
2	Mr. Bhurachandra Ganbhoj	Mahabal Enviro Engineers Pvt. Ltd.	Nagpur
3	Ms. Kirti Pilankar	Eurofins Spectro	Navi Mumbai
4	Mr. Yogesh Malik	Eurofins Spectro	Navi Mumbai
5	Ms. Samruddhi Bhandarkar	Autocal Solutions Pvt. Ltd.	Mumbai
6	Ms. Vidya Kasar	Autocal Solutions Pvt. Ltd.	Mumbai
7	Dr. Sanjay V. Kolase	Mahatma Phule Krushi Vidyapeeth (MPKV), Rahuri	Rahuari
8	Dr. V.K. Bhalerao	Mahatma Phule Krushi Vidyapeeth (MPKV), Rahuri	Rahuari
9	Ms. Leona Gurrala	Parbhani Agriculture College	Parbhani
10	Mr. Roshan Chandurkar	Parbhani Agriculture College	Parbhani
11	Digvijay Kerkar	CWAS	Kolhapur



CENTER FOR WATER AND SANITATION

The Center for Water and Sanitation (CWAS) is a part of CEPT Research and Development Foundation (CRDF) at CEPT University. CWAS undertakes action-research, implementation support, capacity building and advocacy in the field of urban water and sanitation. Acting as a thought catalyst and facilitator, CWAS works closely with all levels of governments - national, state and local to support them in delivering water and sanitation services in an efficient, effective and equitable manner.