



Analysis of Coliform Bacteria in Yamuna River at Yamunanagar

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ABSTRACT

Working on a B.Tech Major Project on the topic “ ANALYSIS OF COLIFORM BACTERIAL IN YAMUNANAGAR RIVER AT YAMUNANAGAR ” is one of the most valuable and exciting experiences in our education. The knowledge we learned and the confidence we achieved during the study years will be beneficial for our whole life.

Words do not suffice to express my deep sense of gratitude to **Er. Kulvinder Singh** (HOD, Civil Engineering Department), **Er. DeepakKumar**, **Er. Jatinthereja** (Assistant Professor, Civil Engineering Department), for their guidance and support throughout the preparation of the major project. Their insight and wide knowledge guided us to the completion of our work. We are also very thankful to them for the motivation and inspiration that triggered us for our major project work.

Keywords:Coliform bacteria, Fecalcoliform, Biological Oxygen Demand Incubator (BOD).

1. INTRODUCTION

Every living organism needs water to survive on earth and the use of water daily is much more. Water contains much more bacteria instead of which may be more harmful to the health of humans and aquatic life such as coliform bacteria. For the preservation of public and environmental health, we use drinking water without pathogenic bacteria. One of the water sources that is used by the community is river water. Rivers provide water from soil layers and moment of water from hills and drainage that are relatively close to the soil surface, allowing to pollute through seepage from the feces of human, animal, or household waste.

Coliform bacteria are organisms that are present in the environment and the feces of all warm-blooded animals and humans. Coliform is a large group of several types of bacteria from the same family. Most are rich in soil, surface water, and vegetation and some originated from human or animal fecal sources. Coliform bacteria will not cause illness. If coliform bacteria are present in drinking water or river, then it indicates the disease-causing organism (pathogenic) could be in the water system. Recently, the most commonly measured bacterial indicators are the coliform group used to determine the bacteriological characteristics of natural water. Quality can be observed through the characteristics of water by the needs and use of water, for example, drinking water, fisheries, irrigation, industry, recreation, and so on. Water pollution has become a problem in various countries and has the attention of researchers on water pollution around the world.

By the study, it has been seen that there are three different groups of coliform bacteria;

- 1) Total coliform.
- 2) Fecal coliform and
- 3) Escherichiacoli.

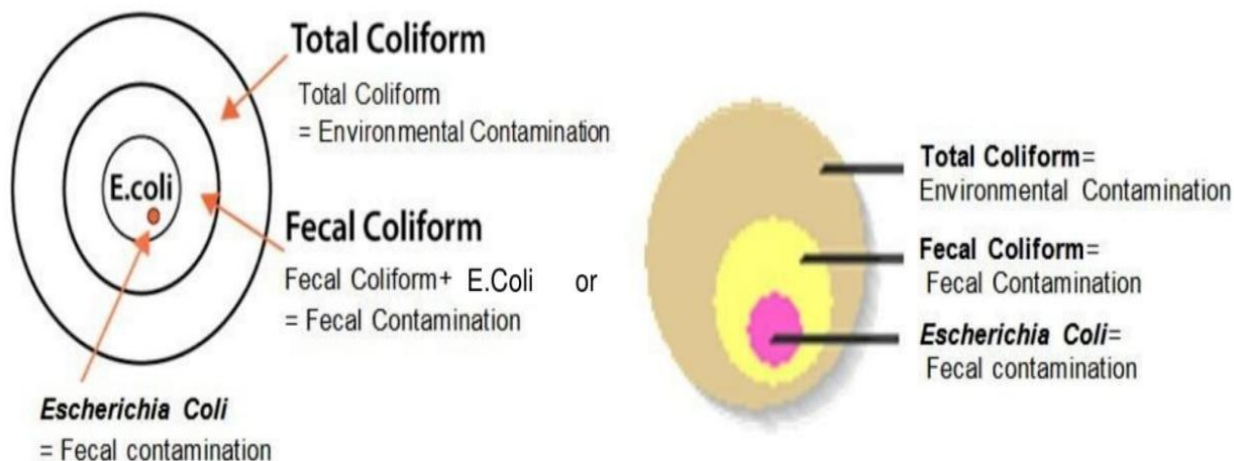


Fig: Diagrams showing different groups of coliform bacteria.

1) Total coliform:

Total coliform bacteria are usually found in the environment and are in general harmless. If only total coliform bacteria are discovered in drinking water, the source is maybe environmental.

2) Fecal coliform:

Fecalcoliform bacteria are a sub-group of total coliform bacteria. They appear in great quantities in the intestines and feces of people and animals. The presence of fecalcoliform in a drinking water sample often indicates recent fecal contamination, meaning that there is a greater risk that pathogens are present than if only total coliform bacteria are detected.

3) Escherichiacoli:

Escherichia coli is a sub-group of the fecalcoliform group. Most Escherichia coli bacteria are harmless and are found in great quantities in the intestines of people and warm-blooded animals. Some strains however can cause illness. It is represented in the short form by E. coli. The presence of E. coli in a drinking water sample almost always indicates recent fecal contamination, meaning there is a greater risk that pathogens are present.

Water is very allowing to bacterial pollution and causes disease (Reed & Rasnake).

A typical coliform bacterium is of the following shape;

- as rod-shaped,
- a gram-negative,
- non-spore forming lactose fermenter.

Coliform bacteria are notable because they are fecal indicator bacteria. Environmental conservation Agencies and other organizations are frequently monitored levels of coliforms in the drinking water supply to find out sewage contamination that could be conducted by fecal patho9

2. OBJECTIVE

To get knowledge about the quality of water.

To identify the type of illness due to pollution of water.

To detect the harmful bacteria which will be harmful to the aquatic animal.

To prevent the land from bacterial infection during the time of irrigation.

To prevent the community from the harmful disease by testing their drinking water with the help of the public health department which has been supplied by the pipeline.

To identify which kind of bacteria are more present.

To provide remedies for the treatment of each and of bacteria.

3.EXPERIMENTAL SETUP AND METHODOLOGY

- Study Area

A water sample is collected for the analysis of coliform and E-coli bacteria from the Yamuna River. Located in the Yamuna Nagar in Haryana India. The sample is collected on the days of 24-April-2022 in the evening time.

- Determination of Bacteria:

For the determination of bacteria, many Apparatuses and chemicals are used in the laboratory which is given below.

1. Chemical use

- Sodium chloride (NaCl)
- Peptone.
- Beef extract.
- Distilled water to make.
- Agar.

2. Apparatus use

- Biological Oxygen Demand Incubator (BOD).
- Conical flask.
- Road.
- Petri plate.
- Hot plate.
- Electronic compact scale.
- Pipette.

- Biological Oxygen Demand Incubator

BOD incubator is the most versatile and reliable low-temperature incubator which is designed to maintain at 20°C necessary for biological oxygen demand (BOD) determination. BOD incubators provide controlled temperature conditions for accelerated tests and exposures. The BOD is an empirical test in which a standardized laboratory procedure is used to determine the relative oxygen requirement of microbes in wastewater, effluents, and polluted water, and in simple water, it is a chemical process that determines how fast biological organisms use oxygen in body water.



- Electronic compact scale

Balance is needed in the microbiology lab for weighing chemical, samples, media, etc. balance are fast to work with but needs frequent calibration. These analytical balances are very sensitive and expensive lab instruments, and also upon the accuracy and precision of analytical

balance the accuracy of lab-analysis results. Generally used balance capacity of 100 gram to 200g gram.

4. Determination of coliform bacteria

The dilution method is used. This method is used to detect the colonies with the help of a microscope. Buffer peptone was used as reagent and agar was used as culture medium.

4.1 Procedure

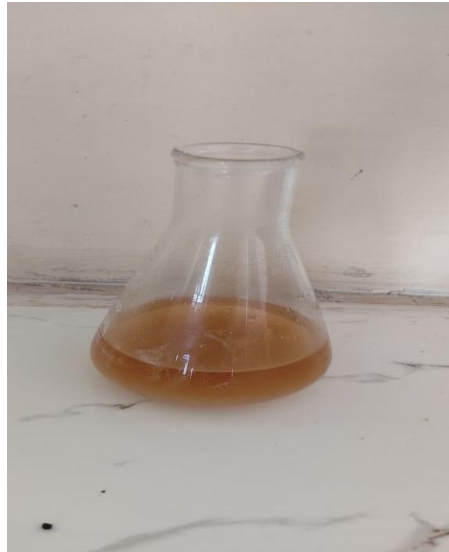
The sample collected in the river gets put into the Petri plate and put into BOD (Biological Oxygen Demand) for seven days so that the foreign particle does not get enter the sample and for the growth of bacteria. First, clean all the apparatus which are used for the analysis of bacteria. Weight all the ingredients accurately on one electronic compact scale. Such as, for 100ml of distilled water weight beef extract of 1gm, peptone of 1gm, sodium chloride of 0.5gm, and agar of 2gm. The weighted ingredient is added own the conical flask and put the distilled water in the ingredient mix all the ingredients in the conical flask with the help of a rod and mixed them homogenously. If all the ingredients do not get mixed properly the media is heated on the burner at the temperature of (60-90) °c to dissolve all ingredients till to get clear yellow colored liquid.



Pic: measurement of ingredient.



Pic; heating to ingredient to dissolve.



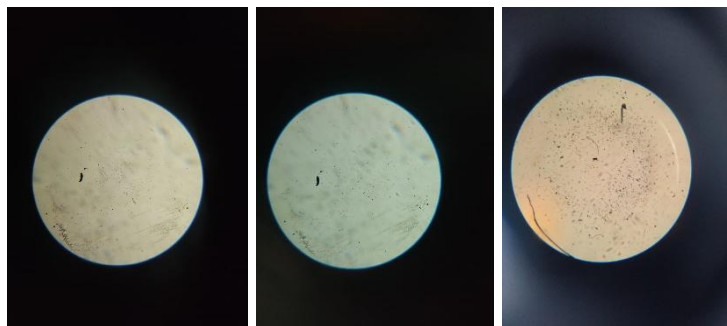
Pic:- the yellow color of media.

Pour all mixed media into the Petri plate and put it for cool purpose and mixed the sample on these media after some time like 1 to 2 hrs it changes into solidified form. Put that media into the BOD (Biological Oxygen Demand) for 24hrs then the colonies are seen into them as a form of gases.

Colonies that are found in media are taken into the test tube and methylene blue is added own it and in another test tube, methylene red is added to it. Take a sample from a tube into the glass mirror and put a glass cap into the sample to remove air. The sample is get put in the microscope for the identification and the shape are shown below;



Pic: Adding methylene blue and red.



Pic: Bacteria shape.

5. RESULTS

The results regarding the bacteriological community revealed the presence of total coliforms in small numbers in all sampling stations which reflects environmental contamination. The fecalcoliforms and *Escherichia coli* were not detected in the sample. the presence of fecalcoliforms and *Escherichia coli* were due to open defecation in these areas. That is why the people using the waters from all the sampling stations must be aware of the health risks that may occur and therefore the waters must be treated before any domestic use to avoid contracting waterborne diseases.

6. CONCLUSION

By the analysis of the water of the Yamuna river, it has been concluded that waste such as industrial and drain waste are the main impact of gating water pollution and that water is very hazardous for human life and irrigation purpose. By the study of water property, it has been concluded that before supplying water to the society or city it should be first treated by the public health department and then only be supplied to the society.

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