

# A Bacteriological Study of Waters at Sewage Treatment Plant in Bikaner

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Date of Submission: 25-06-2021

Date of Acceptance: 07-07-2021

## ABSTRACT

Waste water and sewage generated by community depends upon the water used by it. In desert, since water has been a scarce resource, its consumption is relatively low and the city of Bikaner is no exception where in, due to the introduction of canal, water uptake has increased resulting in more sewage and waste water generation. Since, not much work has been done to study the sewage waters in this area, the present investigations were undertaken to assess the bacterial load in these waters in Bikaner. The presence of faecal indicator bacteria in sewage water gives an idea of contamination. The sewage water samples were collected and analyzed from both, aerobic and anaerobic stabilizing ponds at Vallabh Garden in the city and were subjected to the MPN (Most Probable Number) of coliform bacteria following the method given by Cruickshank et al. (1975). The MPN count was noted to be higher in anaerobic as compared to aerobic treatment plant.

**Key Words:** Bacteria, Ponds, Sewage treatment, Waste water.

## I. INTRODUCTION

Sewage in defines as the water supply of the used water of community .It contains dilute water broth wastes from residence business, houses and industries. The chemical composition of sewage varies from day today or even from hour it also varies considerably between different areas because they produce the wastes of different characters.

*Escherichia coli* (*E. coli*) is one species of coliform bacteria found in water samples contaminated with sewage. This rod- shaped unicellular organism, only 1 micron in length, is too small to be identified in a water sample. Contamination of water by sewage can be reduced or even eliminated by sewage treatment, a process that helps kill bacteria and other harmful microorganisms. Sewage is treated in facilities called sewage – treatment plants.

Geographically Bikaner has natural slops and is divided in four drainage zones - Vallabh Garden, Shivbari, Murlidhar Vyas Nagar & Gangasahar Sewage of Bikaner city of a people of above seven lakh the main part of the old city as well as half of the Bikaner population is connected in Vallabh Garden zone. There is already existing 78 k.m. sewer lines and 6500 sewer connections in this zone.

From here, it is taken up by the sewage treatment plant where it is treated by primary and secondary treatment processes involving mechanical sieving anaerobic and aerobic treatment in a series of sewage stabilization ponds. Certain bacterial species particularly *Escherichia coli* and related organisms designated as coliforms is the normal inhabitant of the intestine of the human and are constantly present in the faeces. The presence of coliform in water and its detection gives an idea of faecal contamination

## II. MATERIAL AND METHODS

Five test tubes containing double strength lactose broth with durhams tube and 10 test tubes containing single strength lactose broth with durhams tube, Nutrient broth, Bromocresol purple indicator, Distilled water, Sterile pipettes and sterile cotton.

The various medium was prepared and sterilized. The sewage water samples were collected in borosil glass bottles from anaerobic and aerobic stabilizing ponds at Vallabh garden in the Bikaner city (January 2011 to July 2011). Label 5 double-strength lactose broth tubes (10) and 5 single-strength lactose broth tubes (1) and another 5 single – strength lactose broth tubes (0.1). 10 ml water samples was inoculated in each 5 (10) test tubes i.e. 10 ml double strength lactose broth with durhams tubes, 1ml water samples was inoculated into the each 5(1) test tubes containing 5 ml single strength lactose broth with durhams tubes and 0.1 ml of water samples was inoculated into the each 5(0.1) test tubes containing 5 ml single- strength

lactose broth with durhams tubes. All test tubes were plugged with cotton plug. All the test tubes were kept in the incubator at 37 degree celsius for 24 hours. After incubation all the tubes were observed for the presence of acid and gas. The production of acid and gas indicates the presence of coliforms and thus test is positive. The number of positive and negative tubes was matched with Mackie & McCartney, Eds Collee, J.G. et al. 14th Ed. (1996) and accordingly MPN was calculated.

### III. RESULTS AND DISCUSSION

The coliforms bacteria show their presence in sewage water ponds if it contains the sewage of the patients of certain diseases or their carriers. After analysis of sewage water of the anaerobic and aerobic stabilizing ponds it confirms the presence of coliforms bacteria in that which means MPN test are positive.

All the results obtained from the present studies are shown in the table 1. Results of the experiment in 24 hours (from water of both ponds) comes positive in all samples and no results were seen to be negative.

Graph of anaerobic and aerobic ponds shows the results obtained from the experiments. After incubation at 37 degree celsius for 24 hours

the coliforms bacteria were maximum in January 2011 in both the ponds as their MPN was ranging from 1600 and 910 MPN index /100 ml in anaerobic and aerobic pond respectively. The least MPN was noted from all the seven months data as 280 MPN index /100 ml in anaerobic and 240 MPN index /100 ml in aerobic pond. In all the seven sampling months, the data also show that the anaerobic pond are highly polluted from coliform bacteria while in aerobic pond the bacteria profile are very low.

From all the above results of analysis of MPN of sewage treatment plant this was clear that the large number of people of Bikaner were suffering from diseases like cholera during the month of January and their no. was least in the month of June. This means that in months of Jan. either people get contaminated water supply or they eat contaminated food.

And the results also show the good health of people of Bikaner in the month of June 2011 as concern to cholera (coliform bacteria).

WHO given the parameters about the polluted water and potable water. Coliforms may cause various diseases like cholera, which are highly destructive. When the water and food should show complete absence of coliforms, they are safe for the human health.



POSITIVE MPN TEST OF ANAEROBIC STABILIZATION POND, BIKANER



POSITIVE MPN TEST OF AEROBIC STABILIZATION POND, BIKANER

**Table 1:- Analysis of total coliforms count by MPN test (Mackie & McCartney, Eds Collee, J.G. et al.14th Ed.(1996))**

PONDS	ANAEROBIC POND				AEROBIC POND			
	10 ml	1.0 ml	0.1 ml	MPN Index/10 0ml	10 ml	1.0ml	0.1 ml	MPN Index/100ml
JAN	5	5	4	1600	5	5	3	910
FEB	5	5	3	910	5	5	1	350
MARCH	5	5	1	350	5	4	3	280
APRIL	5	5	2	540	5	4	4	345
MAY	5	5	4	1600	5	5	2	540
JUNE	5	4	3	280	5	4	2	220
JULY	5	4	4	345	5	5	0	240

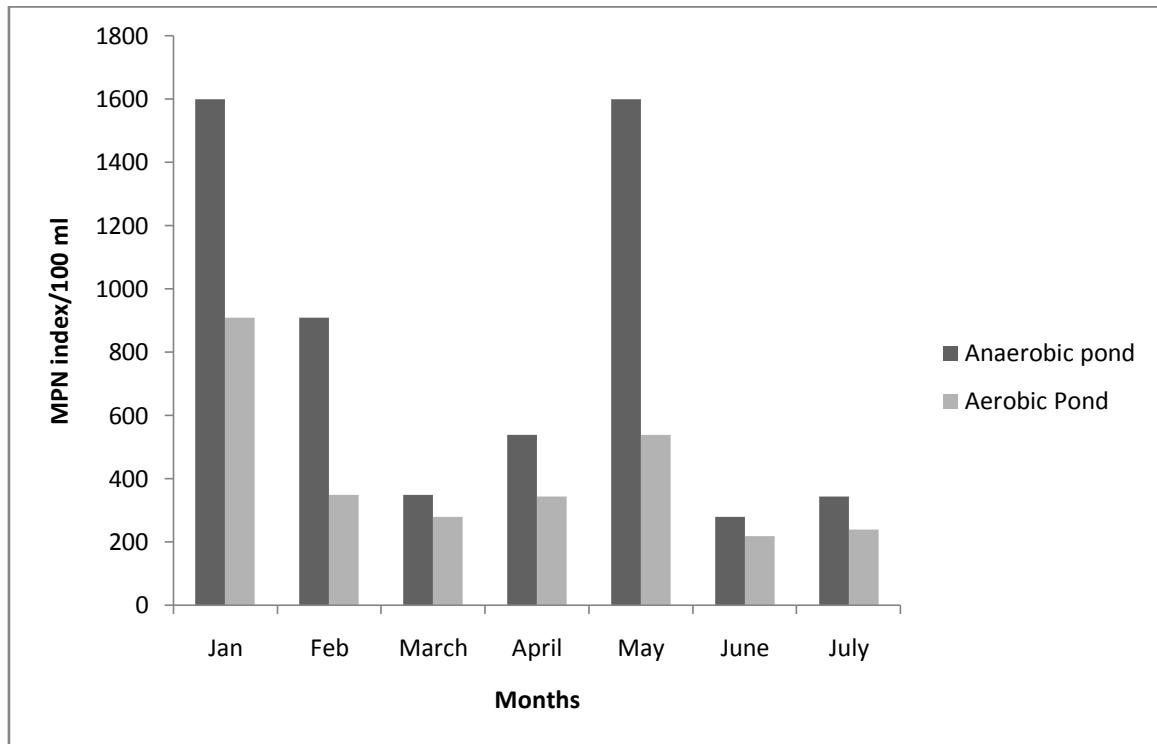


Fig. The graph shows anaerobic and aerobic pond of MPN test

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