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NITRATE CONTAMINATION IN GROUND WATER SAMPLES OF GANG CANAL CATCHMENT AREA (SRI GANGANAGAR DISTRICT)

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Abstract

Ground water samples analysis of Gang Canal catchment area were collected during October-November, 2010 and July-August, 2011. 100 ground water samples were collected from different places of Sri Ganganagar. It was found that nitrate concentration was ranging from 0.34 to 278.68 mg/L. The concentration remains same throughout the period, irrespective of rain/flood period. The permissible limit by WHO of Nitrate is 40-50 mg/L. High Nitrate concentration may cause blue baby syndrome or methemoglobinemia.

INTRODUCTION

The modern civilization, industrialisation, urbanisation and increase in population have lead to fast degradation of our ground water quality. Water contamination is due to settlement, agriculture and industrial activities. As the water is the most important component of eco-system, any imbalance created either in term of amount, which is presence of imputities added to it can hard the whole eco-system.

The quality of public health depends to a greater extent on the quality of ground water, which should be clean and fresh. Chemical analysis of ground water samples from Nagpur showed that fluoride and nitrate concentration increases with increase in salinity. It was found that alkanity and fluoride do not exhibit any significant effect on nitrate.

Groundwater contains various types of pollutants and several other substances are dissolved in it. Concentration of these pollutants which is useful for human body but in a specific limit.

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According to World Health Organisation (WHO) permissible limit of nitrate value is 40-50 mg/L. The Indian Council of Medical Research has recommended desirable limit of 20 mg/L of nitrate for drinking water. High Nitrate concentration was observed in ground water samples of Bhagwansar-Chunawadh in our study.

MATERIALS AND METHODS

Polythene bottles of 2.0 litres and 2.5 litres were used to collect the water samples from different locations of canal area. The samples were collected from borewells as well as from deep handpumps. It was ensured that the concentrations of various water quality parameters do not changes in time that elapses between drawing of samples and the analysis in the laboratory. Some samples which were turbid or containing suspended matter were filtered at the time of collection.

Nitrate ion concentration in underground water in Gang Canal catchment area of North-West Rajasthan.

Village Name	No. of Samples	NO_3^- range mg/L	Mean mg/L
Sadhuwali	5	4.37-10.57	7.38
Maluwala-1ML	6	3.60-25.21	11.57
Khatlabana	6	2.67-20.47	6.62
Matilirathan	3	10.61-11.76	11.38
Kaminpura	3	8.61-10.97	9.55
22 ML	3	7.60-17.48	13.58
Bhompura	2	10.08-10.21	10.15
Kinkrawali	2	15.67-43.36	29.52
Jaloki	2	7.86-8.07	7.97
Z-Miner	1	21.85	21.85
Khyaliwala	4	3.36-8.07	5.59
Fatuhi-Shivpur Head	11	1.01-7.60	3.93
LNP-LNP	6	1.20-7.69	4.32
Koni	12	1.34-7.89	5.10
Mirjewala	9	5.38-12.67	9.03
Mahiawali	7	2.69-8.40	5.19
CC Head	2	6.05-7.87	6.96
Bhagwansar Chunawadh	4	2.98-278.68	65.14
LNP	8	2.02-20.51	8.32
Sadhuwali Z	4	10.87-52.11	25.74
Z Minor	1	20.65	20.65

Observation showed the values determined for NO_3^- concentration in ground water samples ranged form 1.01 to 278.68 mgL^{-1} in Gang canal command area. The permissible and maximum permissible limit of NO_3^- in irrigation water is 45 and 100 mgL^{-1} respectively (WHO).

A perusal of data show that 98 per cent of water samples fall in the category <45 mgL^{-1} of NO_3^- in Gang canal command area. Remaining 2 per cent of water samples grouped in the

category of 45-100 mg. NO_3^-. The results showed that there was no toxicity of NO_3^- in underground water samples.

The higher mobility of NO_3^- particularly in sandy to sandy loam soils puts immediate threat of NO_3^- pollution in ground water. Generally crop recoveries of added N in upland and water logged condition range from 30 to 65% and the rest of N is either lost through dinitrification, volatization, leaching or immobilized in the soil. In case of NO_3^- containing fertilizers the losses through leaching are very high due to higher mobility and less fixation of nitrates in soil. Most of the leached NO_3^- in deeper layer of soil, becomes a part of underground water.

Antil worked on leaching of nitrate under moisture regimes and found that leaching of NO_3^- increased with increase in the initial water content of soil upto field capacity. These studies suggest that applying irrigation water frequently and at low depth (rates) could reduce the leaching losses of NO_3^- and to check the NO_3^- content of underground water.

Mathur and Kalicharan worked on underground water of Agra city and found that the NO_3^- of water sample ranged from 20 to 540 mgL^{-1} in which 50 and 25% of water samples contain NO_3^- more than 45 and 200 mgL^{-1} respectively.

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