Water Quality Analysis of Farm Water by Investigating Different Physical and Chemical Parameters

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Abstract:

Water is perhaps the most precious natural resource after air. As water is required for different purposes, the suitability of it must be checked before use. Water quality has been linked to health outcomes across the world. Thus the quality of water is very important in both environmental and economic aspects therefore water quality analysis is essential for using it in any purpose. The present study has determined water quality assessment of well water found in different areas of Villege Mursa, Taluka, Bhadrawati District, Chandrapur (M.S.) on the basis of physico-chemical analysis such as pH, EC (Electrical Conductivity), Chlorine, Calcium, Magnesium, Sodium, Potassium, Sulfate, Carbonate and Bicarbonate. The water samples were collected at seven sampling sites and studies were performed to assess the levels of some physical and chemical water quality in seven wells. The obtained values are compared with the standard limits. The results of this study reveal that the physico-chemical parameters are within the maximum permissible limit of WHO with some slight variations in some parameters. Hence, water is safe and suitable for domestic and irrigation purposes.

Key words: water quality, physico-chemical parameters, Mursa, well, Investigation.

1. Introduction

Water quality can be defined as the chemical, physical and biological characteristics of water, usually in respect to its suitability for a designated use. After many years of research, water quality standards are put in place to ensure the suitability of efficient use of water for a designated purpose. Water quality analysis is to measure the required parameters of water, following standard methods, to check whether they are in accordance with the standard.

Water dissolves the minerals from the rock in which it is stored. Therefore, the physical and chemical parameters of the particular area will be changed. The quality of water varies with depth of water. The purpose of present study is to find out any impurities exertive on receiving water of Well. This well is used for agriculture purposes. However, the water quality available for irrigation is often overlooked, leading to issues related to crop yield, soil fertility and even human health. Poor quality of water can lead to salinization, alkalinization and nutrient imbalances in the soil, which ultimately affects agricultural productivity. This research focuses on assessing the water quality used for agricultural irrigation in the village Mursa, located in Taluka Bhadrawati, District Chandrapur, Maharashtra. The objective of this study is to evaluate the physiochemical properties of water and determine whether the water in this region is suitable for irrigation based on the standard guidelines.

2. Materials and Methods

Study area:

Mursa is a rural area located in the Bhadrawati Taluka, Chandrapur, District in Maharashtra State (India). The main sources of irrigation water in Mursa include wells and borewells. The study samples were collected from different location across the villege Mursa. The water sample collected in clean, sterilized air dried one liter polyethelene bottle and was immediately brought into the laboratory for the estimation of various Physico-chemical parameters. All water samples was analyzed for physicochemical analysis using standard procedure recommended by IS specification. Analysis of pH, EC, Chlorine, Calcium, Magnesium, Sodium, Potassium, Sulfate, Carbonate and Bicarbonate was carried out in laboratory and data is reported in Table No.1

RESULTS AND DISCUSSION

The results of the physicochemical analysis of the groundwater samples S1 to S7, collected from 7 different areas of Villege Mursa, Taluka, Bhadrawati District, Chandrapur (M.S.) are presented in Table 1.

pH: pH is an important parameter which determines the suitability of water for various purposes. pH has no direct effect on human health, all biochemical reactions are sensitive to the variation of pH. The pH values fluctuated between 7.00 to 8.10. pH values of most of the water samples were well within the permissible limit except sample S2, S3 and S6 which is above the permissible limit.

Electrical conductivity (EC): Electrical conductivity (EC) determines the water quality for drinking and agricultural purpose. The electrical conductivity of water sample was found to be varying from 0.48 µS/cm to 2.19 µS/cm. All the samples were found to have EC above permissible value except sample S6 and S7 which is within the permissible limit.

Chlorides: Chlorides is one of the most important parameter in assessing the water quality. Higher concentrations of chlorides indicate higher degree of organic pollution. In this study, Chloride value of all samples was found in range from 1.20 to 2.40 mg/l. The Chloride values observed in present study were in the permissible limit.

Sodium: Sodium value of all samples was found in range from 0.42 to 0.84 mg/l. The Sodium values of all the samples are within the range of permissible limit.

Calcium: The quality of calcium in natural water depends upon the types of rocks. Calcium value of all samples was found in range from 1.64 to 2.62 mg/l. The Calcium values of all the samples are above the range of permissible limit.

Table No. 1:- Physicochemical Parameter of Seven Water Samples

Parameter	S1	S2	S3	S4	S5	S6	S7
pH	7.30	7.70	7.90	7.20	7.00	8.10	7.30
EC (µs/cm)	1.35	0.96	1.22	1.51	2.19	0.48	0.58
Chloride (mg/l)	2.40	2.40	1.20	2.00	1.60	2.00	2.00
Sodium (mg/l)	0.72	0.72	0.49	0.55	0.70	0.42	0.84
Calcium (mg/l)	2.20	2.62	2.14	1.64	2.08	1.74	2.92
Magnesium (mg/l)	1.76	1.42	0.98	1.30	1.88	2.50	1.92
Potassium (mg/l)	0.49	0.41	0.62	0.58	0.66	0.63	0.52
Sulphate (mg/l)	0.77	1.77	0.42	1.08	1.72	2.29	2.60
Carbonate (mg/l)	0.80	0.40	0.80	0.80	0.80	0.40	0.40
Bicarbonate (mg/l)	1.20	0.60	1.80	0.20	1.20	0.60	1.20

Magnesium: Magnesium value of all samples was found in range from 0.98 to 2.50 mg/l. The Magnesium values of all the samples are within the range of permissible limit.

Potassium: Potassium value of all samples was found in range from 0.41 to 0.66 mg/l. The Potassium values of all the samples are within the range of permissible limit.

Sulphate: Sulphate value of all samples was found in range from 0.42 to 2.60 mg/l. The Potassium values of all the samples are within the range of permissible limit.

Carbonate: Carbonate value of all samples was found in range from 0.40 to 0.80 mg/l. The Carbonate values of all the samples are within the range of permissible limit.

Bicarbonate: Bicarbonate value of all samples was found in range from 0.20 to 1.20 mg/l. The Bicarbonate values of all the samples are within the range of permissible limit.

Conclusion:

Water quality analysis of form water by investigating different physical and chemical parameters of water samples S1 to S7 from seven different irrigational field of Mursa village, Bhadrawati Taluka Region in Chandrapur district (M.S.). Majority of the samples show that the parameter pH, EC (Electrical Conductivity), Chlorine, Calcium, Magnesium, Sodium, Potassium, Sulfate, Carbonate and Bicarbonate values are well within the permissible limits. The parameters in most of the water samples are in normal range and indicated better quality of water. All the different irrigational field of Mursa village was consistent with World Health Organization standard for irrigation water (WHO).

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References:

[1] Basavaraja Simpi, S.M. Hiremath, KNS Murthy, K.N.Chandrashekarappa, Anil Patel, E.T. Puttiah, Global Journal of Science Frontier Research, 2011, 11(3), 31-34.
[2] Kidu Mezgebe, Abraha Gebrekidan, Amanual Hadera, Yirgaalem Weldegebriel' Bull. Chem. Soc. Ethiop. 2015, 29(3), 377-385.
[3] ISI, Indian Standard specification for drinking water, IS10500, ISI, New Delhi, 1983.
[4] W.H.O, Guidelines for drinking water quality, Vol.1, Recommendations WHO, Geneva, 1984.
[5] Ajit M. Kalwale, Padmakar A. Savale, Advances in Applied Science Research, 2012, 3 (1), 273-279.
[6] T.Suresh and N.M.Kottureshwara, Rasayan J. Chem., 2009, 2 (1), 221-233.
[7] Murhekar, G. *Res. J. Chem. Sci.* 2011, 1, 117.
[8] S. A. Manjare, S. A. Vhanalakar and D. V. Muley, International Journal of Advanced Biotechnology and Research, 2010, 1(2), 115-119
[9] R. B. Dhake, R. P. Phalak and G. P. Waghulde, *AJCER*, 2008**,** 1(1), 54.
[10] Devendra Dohare, Shriram Deshpande and Atul Kotiya. *Research Journal of Engineering Sciences*, 2014, 3(5), 26-31.