Groundwater Quality Assessment for Suitable Agricultural Irrigation using Physico-Chemical Water Analysis in Sonurli Villege, Taluka, Korpana District, Chandrapur (M.S.)

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Abstract: Groundwater plays a vital role as important source of drinking water and irrigation. The present work was conducted to assess the physico-chemical parameters of well found in Villege Sonurli, Taluka, Korpana District, Chandrapur (M.S.) and determines its suitability for domestic and irrigation purposes. Water samples were collected at seven sampling sites and analyzed for various physico-chemical parameters. Studies were performed to assess the levels of some physical and chemical water quality in seven wells. The following 10 parameters have been considered viz. pH, EC (Electrical Conductivity), Chlorine, Calcium, Magnesium, Sodium, Potassium, Sulfate, Carbonate and Bicarbonate. These parameters are used to determine the quality of groundwater by comparing the quality of drinking water standards published by WHO and ISI (Indian standard specification for drinking water). 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 irrigation purposes.

Key words: physico-chemical parameters, Groundwater quality, well, water, irrigation.

1. Introduction

Water is most essential to all forms of life. Agriculture production is also one of the largest water utilizing sectors. It is indispensable for agriculture, manufacturing, transportation and many other human activities. Despite its importance, water is the most poorly managed resource in the world and contaminated by several sources. Due to increasing of various human activities and some natural processes, the quality of water is decreasing continuously and is posing a great threat to all forms of life including humans. The polluted water is the culprit in all such cases. We need water every day for various domestic, irrigation and drinking purposes. Economy of our country is agro based economy. Most of the people who live in villages get their jobs in agriculture field due to irrigation facilities in that sector. When there is no revolution in industry and agriculture, water quality was near about good. But due to industrial and agriculture revolution water which is collected in the various water resources highly polluted in various ways. So it was not suitable and safe for irrigation purposes. The main objectives of the physico-chemical study are to know the distribution of solutes in the well water and suitability of the ground water for agriculture purposes. The purpose of present study is to find out any impurities exertive on receiving water of well. This well water is used for agriculture purposes.

2. Materials and Methods

Study area:

The study samples were randomly selected from Sonurli Villege, Taluka, Korpana District, Chandrapur in Maharastra State (India). The water sample collected in clean, air dried one liter polyethelene bottle. The water samples were immediately brought into 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 (Electrical Conductivity), 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 are presented in Table No. 1.

pH: pH of water the important ecological factor and provides an important piece factor and piece of information in many types of geochemical equilibrium or solubility calculation. The pH values fluctuated between 7.5 to 7.9. pH values of most of the water samples were well within the permissible limit.

Electrical conductivity (EC): Electrical conductivity (EC) is a measure of water capacity to convey electric current. It signifies the amount of total dissolved salts. The electrical conductivity of water sample was found to be varying from 0.73 μS/cm to 1.66 μS/cm. All the samples were found to have EC above permissible value. The higher the EC, less water is available to plants, even though the soil may appear wet. Because plants can only transpire "pure" water, usable plant water in the soil solution decreases dramatically as EC increases. Therefore, irrigation water with high EC reduces yield potential.

Chlorides: Chlorides are important in detecting the contamination of ground water by waste water. Increased level of chlorides in water indicates water pollution. In this study, Chloride value of all samples was found in range from 2.80 to 5.80 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 0.39 to 0.76 mg/l. The Sodium values of all the samples are within the range of permissible limit.

Calcium: Calcium value of all samples was found in range from 1.22 to 2.48 mg/l. The Calcium values of all the samples are above the range of permissible limit except sample S2 which is within the permissible limit.

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

Parameter	S1	S2	S3	S4	S5	S6	S7
pH	7.60	7.70	7.80	7.90	7.80	7.60	7.70
EC (μs/cm)	1.66	0.73	1.03	0.78	1.04	0.79	1.08
Chloride (mg/l)	2.80	4.80	4.00	3.60	3.20	2.80	5.20
Sodium (mg/l)	0.59	0.51	0.60	0.39	0.65	0.76	0.72
Calcium (mg/l)	2.48	1.22	1.68	2.38	1.54	1.50	1.92
Magnesium (mg/l)	1.96	1.50	2.38	0.92	1.08	1.48	1.90
Potassium (mg/l)	0.46	0.61	0.48	0.55	0.44	0.79	0.55
Sulphate (mg/l)	0.89	0.00	0.00	0.00	0.00	0.00	0.00
Carbonate (mg/l)	0.80	0.40	0.40	0.80	1.20	1.20	0.40
Bicarbonate (mg/l)	1.00	1.80	1.00	1.00	1.60	1.40	0.80

Magnesium: Magnesium value of all samples was found in range from 0.92 to 2.38 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 0.44 to 0.79 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 0.00 to 0.89 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 1.20 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 0.80 to 1.80 mg/l. The Bicarbonate values of all the samples are within the range of permissible limit except sample S2 and S5which is above the permissible limit.

Conclusion:
The physicochemical analysis of the groundwater samples S1 to S7 from seven different places in Sonurli Villege revealed that majority of the samples show that the parameter pH, EC, 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. It is advisable that people from this area can use well water for irrigation purposes.

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