Int.J.Curr.Microbiol.App.Sci (2018) *7*(8): 1020-1023

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 7 Number 08 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.708.114

Effect of Sewage Water on Irrigation Water Quality in Guntur District of Andhra Pradesh, India

K. Jaya, G. Ramachandra Rao*, G.V. Lakshmi and P. Madhu Vani

Department of Environmental Sciences, Advanced Post Graduate Centre, ANGRAU, Lam, Guntur – 522 034, Andhra Pradesh, India

**Corresponding author:*

Keywords

Sewage water, COD and BOD

Article Info

Accepted:
08 July 2018
Available Online:
10 August 2018

A B S T R A C T

A study on "Effect of sewage water on irrigation water quality in Guntur district of Andhra Pradesh" was conducted at Department of Environmental Sciences, Advanced Post Graduate Centre, Guntur during 2016-17. Water samples were collected from eight different locations namely Reddypalem, Ring road, Autonagar, Nandivelugu, Manasa Sarovaram, Ponnur road, Lakshmipuram and Collector office road. The samples were analysed for pH, EC, COD and BOD. The pH ranged from 7.1 to 7.5 in which highest pH was observed in Reddypalem and lowest was observed in Nandivelugu. ECw in sewage water ranged from 1.6 to 1.9dS m^{-1} in which Collector office road was recorded with highest ECw and lowest was recorded in Nandivelugu. COD ranged from 414 to 439mg L^{-1} and BOD ranged from 290 to 307mg L^{-1}. The organic load was highest in Lakshmipuram area and lowest in the Ring road area. The results obtained from different sampling stations are found to be within the range of Indian standards of Physical-

Introduction

Water is becoming the most important limiting natural resources now days. Hence, its multiple use and re-use is becoming more and more important to meet the increased demand of agricultural production. Sewage water have a high nutrient load, suspended solids, heavy metals and many other toxic materials / chemicals which may be hazardous and it may affect the soil quality and also the plant growth and development. Farmers in peri-urban areas who live closer to such water sources divert this untreated waste water for irrigation whenever needed as it proves to be low-cost alternative to conventional irrigation. Cheraghi *et al.,* (2009) suggested that out of 30 million tonnes of waste water produced annually all over the world, 70 % is consumed as an agricultural fertilizer and irrigation source. Farmers are benefited with high yield in the sewage water irrigated fields with less fertilizer inputs due to high nutrient content (Patel *et al.,* 2007). Ghani *et al.,* (2016) reported that electrical conductivity considerably elevated in wastewater as compared to canal water. The EC of wastewater was 1860 µS cm^{-1} while that of canal water was 240 µS cm^{-1}. Virendra and Chandel (2011) reported that the BOD levels

of sewage water of Jaipur ranged from 13 to 253mg L^{-1} which exceeded the desirable limits (100mg L^{-1}) which implied that primary treatment of water required before being used in farming. Abida and Harikrishna (2008) reported that the sewage water contains the minimum COD value of 506.9 mg L^{-1} and the maximum value of 602.9 mg L^{-1}.

Materials and Methods

Water samples were collected from the centre of the sewage flow area after avoiding the floating debris on top in a clean stoppered tarson bottles after rinsing it with the same water 3-4 times. The pH and electrical conductivity were measured immediately after collection of samples. pH was determined by taking about 50 mL water sample in a 100 mL clean bottle and immersing the glass and calomel electrodes or combined electrode of the pH meter.

The pH meter was first adjusted to the known pH of buffer solutions having pH of 4.0, 9.2 and 7.0. The pH indicated on the dial was noted.EC was determined by taking water sample in a clean 100 mL beaker and by immersing the conductivity cell of EC meter. EC meter was first adjusted using 0.01 N KCl to get the reading of 1214 (Jackson, 1973). EC indicated on dial was noted and was expressed in d S m^{-1}.

The Biological Oxygen Demand (BOD) of sewage water was determined by making suitable dilution of sewage water with standard dilution water which was prepared by aerating with distilled water. The dissolved oxygen of the samples before and after incubation at 20^0C for five days was determined by titrating it against sodium thiosulphate using starch indicator and the BOD of sewage water was calculated as described by Tandon (1998). The Chemical oxygen demand (COD) of sewage water was determined by open reflux method. The sample was refluxed in concentrated H_2SO_4 medium containing excess of potassium dichromate for two hours at around 150^0C temperature. After digestion it was titrated against standard ferrous ammonium sulphate (FAS) and the COD of sewage water was calculated as described by Tandon (1998).

Results and Discussion

The pH of sewage water was neutral. Lowest pH of 7.1 was recorded at Nandivelugu area and highest pH of 7.5 was recorded in Reddypalem area. The tolerable limit of pH for irrigation varies between 6.5-8.5 (APHA, 1985). Neutral pH values support biological activity essential for the natural cleaning up process in the absence of a good sewage treatment.

The neutral reaction of sewage water had also been reported by Sudheer and Sivaramaprasad (2013) at sewage drains of Guntur and Binu Kumari *et al.,* (2006) in Coimbatore. Electrical conductivity is an important parameter for assessment of salt contents in irrigation water. The ECw ranged from 1.3 to 2.1 d Sm^{-1}.The maximum ECw of 1.9 dSm^{-1} was observed at collector office road and the minimum ECw of 1.6 $dSm^{-1}$was found at Nandivelugu area. The ECw of sewage water varied in September to February was 1.7 to 1.9 d Sm^{-1} (Table 1). The conductivity values of sewage water flow were within the permissible limit. The dissolved salt content of the municipal sewage water indicated that it can be used for irrigation with restrictions

Similar results were also reported by Binu Kumari *et al.,* (2006) who reported the EC ranging from 1.39 to 3.84 d Sm^{-1} in sewage water in Coimbatore. The COD in sewage water ranged between 357 and 473 mg L^{-1}. The minimum COD was observed in Ring road (414 mg L^{-1}) whereas, maximum content

was observed in Lakshmipuram (439 mg L^{-1}). The concentrations of COD varied in September, October, November, December, January and February was 421, 430, 436, 430, 421 and 431 mg L^{-1} respectively (Table 2). The COD was high in sewage water compared to normal open well water (268 mg L^{-1}).

Table.1 Effect of sewage water on pH and ECw of water

Location	pH	ECw
Reddypalem	7.5	1.7
Ringroad	7.3	1.8
Autonagar	7.4	1.7
Nandivelugu	7.1	1.6
Manasa Sarowaram	7.3	1.7
Ponnur Road	7.4	1.8
Lakshmipuram	7.3	1.8
Collector office road	7.4	1.9

Note: ECw in dS m^{-1}

Table.2 Effect of sewage water on COD and BOD of water

Location	COD	BOD
Reddypalem	420	295
Ringroad	414	290
Autonagar	423	296
Nandivelugu	422	299
Manasa Sarowaram	418	293
Ponnur Road	418	293
Lakshmipuram	439	307
Collector office road	424	297

Note: COD and BOD expressed in mg L^{-1}

Binukumari *et al.,* (2006) also reported COD of sewage water between 180 to 746 mg L^{-1} in municipal sewage water at Coimbatore. The BOD in sewage water ranged between 250 and 331 mg L^{-1}. The minimum BOD was observed in Ring road (290 mg L^{-1}) whereas, maximum content was observed in Lakshmipuram (307 mg L^{-1}). The concentrations of BOD varied in September, October, November, December, January and February was 274, 301, 304, 301, 295 and 301 mg L^{-1} respectively (Table 2). The BOD was high in sewage water compared to normal open well water (105 mg L^{-1}). Similar results were also reported by Anita Singh (2009) in sewage drains of Varanasi.

It is concluded that the reuse of wastewaters for purposes such as agricultural irrigation reduces the amount of water that needs to be extracted from environmental water sources. The pH of the sewage water was neutral in nature with an overall range of 6.8 to 8.1. The pH of sewage was within safe limits of 6.0 to 8.5 for irrigation. The electrical conductivity of sewage water can be categorized under good quality water for irrigation. EC was in the range from 1.3 to 2.1 dSm^{-1}. The BOD

and COD of sewage water were observed from 250 to 331 mg L^{-1} and 361 to 473 mg L^{-1} respectively. The physicochemical parameters studied in this work were varied between the stations, and almost all parameters studied were within the permissible limits prescribed by American Public Health Association.

References

Abida and Harikrishna. 2008. Study on the Quality of Water in Some Streams of Cauvery River. *Journal of Chemistry*. 5(2): 377-384.

APHA. 1985. Standard methods for the examination of water and waste water, Washington, (American Public Health Association) D.C., United States of America.

Anita Singh., Rajesh, K., Sharma Madhoolika., Agrawal and Marshall, F. 2009. Effects of Wastewater Irrigation on Physicochemical Properties of Soil and Availability of Heavy Metals in Soil and Vegetables. *Communications in Soil Science and Plant Analysis.* 40: 3469–3490.

Binu Kumari, S., Kavitha Kirubavathy, A and Rajammal Thirumalnesan. 2006. Suitability and water quality criteria of an open drainage municipal sewage water at Coimbatore, used for irrigation. Journal of Environmental Biology. 27(4): 709-712.

Cheraghi, M., Lorestani, B and Yousefi, N. 2009. Effect of waste water on heavy metal accumulation in Hamedan Province Vegetables. *International Journal of Botany*. 5: 190-193.

Ghani, A., Muhammad Ikram, Mujahid Hussain, Iftikhar Ahmad, Muhammad Imran, Mishal Iftikhar, Muhammad Farooq, Tahira Hameed, Noor Muhammad, Hira Fatima and Muhammad Arshad. 2016. Effect of municipal wastewater on the nutritional and proximate composition of selected vegetables grown at silanwali road Sargodha. *International Journal of Innovative Research and Review*. 4 (2): 5-9.

Jackson, M. L.1973. Soil Chemical Analysis. Prentice Hall of India Private Ltd, New Delhi.

Patel, M.M, Patel, P.T and Patel, B.M. 2007. Effect of sewage water irrigation and levels of nitrogen on yield and uptake of dillseed (*Anethum graveolus* L.). Haryana. Journal of Agronomy. 23(1/2): 91-94.

Sudheer, B.V and Sivaramaprasad, V. 2013. Water Quality in Raw Water in Municipalities of Guntur District Andhra Pradesh. *International Journal of Science and Research*. 4: 972-974.

Tandon, H. L. S, 1998, Methods of Analysis of Soils, Plants, Water and Fertilizers. Fert. Dev. and Consultation Org, New Delhi, India. 31, pp. 9-16.

Virendra Singh Shekhawat and Singh Chadel, C.P. 2011. Seasonal appraisal of physic chemical parameters of waste water discharged in Amanisha-Nalla of Jaipur city, Rajasthan. *Pollution Research.* 30(4): 587-591.

How to cite this article:

Jaya, K., Ramachandra Rao, G., Lakshmi, G.V. and Madhu Vani, P. 2018. Effect of Sewage Water on Irrigation Water Quality in Guntur District of Andhra Pradesh, ?India. *Int.J.Curr.Microbiol.App.Sci.* 7(08): 1020-1023. doi: https://doi.org/10.20546/ijcmas.2018.708.114