Studies on the Use of Domestic Waste Water as a Source of Irrigation in Khar Land

A.N.Yadav, N. H. Khobragade
Khar Land Research Station, Panvel, Dr. B.S.Konkan Krishi Vidyapeeth, Dapoli, India.

Abstract – The water which discharged from the residential areas into the eco-system after domestic use is considered as useless or waste water. On account of increased demand of fresh water for various human needs like drinking, bathing, cleaning of dress materials, domestic utensils etc. the scarcity of the fresh water has been felt. Globally only 2 per cent fresh water is available. As regards the available references on the use of waste or sewage water, the same was first started in Mumbai in 1897, in Delhi from 1913 and in Pune from 1916 for growing various crops. In West Bengal, the waste water or sewage water was used for rearing fish on nearly 4000 ha. area. It is reported that around 20% fishes consumed by the Calcutta city people is supplied through this system of culture. (W.H.O. Tech report, No. 778/1989). It is therefore, desirable to optimally use the available fresh water resources and also was convicted to use domestic waste water for growing crops. Important properties deciding usability of the said domestic water are presented and discussed.

Index Terms – Domestic waste water, EC, pH.

1. INTRODUCTION

On account of increased demand of fresh water for various human needs like drinking, bathing, cleaning of dress materials, domestic utensils etc. the scarcity of the fresh water has been felt. Globally only 2 per cent fresh water is available. In view of this domestic waste water coming from nearby residential colonies through Panvel municipal nala is being used for irrigating the *Kharif* as well as rabbi crops of coastal saline soils of Khar Land.

2. MATERIALS AND METHODS

The experiment was conducted since 1995 to 1997 at the farm of Khar Land Research Station, Panvel, Konkan Krishi Vidyapeeth, Dapoli (M.S.). The domestic waste water coming from nearby residential colonies through Panvel municipal nala was diverted in the farm nala. Crud seperation of sundry material such as plastic bags etc. was done with the help of iron net fixed in nala itself and finally it was collected in big tank. Electric pump was installed up in tank for lifting the water for irrigation purpose. The chemical analysis such as pH, EC, salt content, osmatic pressure, Calcium, Magnesium, Sodium, Nitrate, Nitrite, Sulphides free and saline amonia content of said water have been determined in the Soil Science Laboratory by adopting standard methods of analysis. Sodium adsorption ratio (SAR) has been calculated for rating the water for irrigation purpose. The water was also got analysed for heavy metals like Iron, Copper, Mercury, Zinc, Cadmium and Nickel from the Maharashtra Pollution Control Board Laboratory, Navi Mumbai. The importance of analytical parameters deciding the usability of water for irrigation purpose are presented and discussed.

3. RESULTS AND DISCUSSION

The analysis of the domestic waste water for various analytical parameters revealed that the pH was quite normal, while the electrical conductivity was 0.15 dSm^{-1} with a salt concentration of 1.5 mg/lit. The osmotic pressure found to be 0.05 atm, Calcium and Magnesium were 24 mg/lit. and 17.08 mg/lit. respectively. The Sodium, Carbonate and Bicarbonate were 20.70 mg/lit, 120 mg/lit. and 366 mg/lit. respectively. The SAR value was calculated as 0.78.

As per the safe parameters for irrigation water the pH should have been between 7.0 to 8.0, while electrical conductivity less than 750 mm. hos/cm. The Calcium is reported to be around 400 mg/lit, while Mangnesium, Sodium and Bicarbonate should be 60,480 and 610 mg/lit respectively. The SAR value is supposed to be less than 10. The Sulphate content should be around 960 mg/lit (Kulkarni, *et al* 1998).

In the light of suitability of parameters, the parameters of the present waste water appear to be reasonably in limit. The pH is almost within safe limit, the electrical conductivity is also very low. The SAR value is much below than the maximum limit, similarly Sulphate, Calcium, Magnesium and Sodium contents are also very low.

Among the heavy metals Copper, Lead, Cadmium, Nickel were found to be absent while Iron, Zinc and Merqury were recorded as 1.25, 0.06 and 0.05 mg/lit., respectively. The bio-assay studies conducted, indicated that sample is non toxic. Based on SAR values the water can be classified in grade-1 as the SAR value is much below that 10 and reported to be good for taking the crop like *Bhendi, Udid, Mung* and other various crops. (Kulkarni, *et al* 1998). The protective irrigation were given to paddy and vegetable crops as and when dry spell noticed.

Table 1. Chemical analysis of domestic work waste water

Sr. No.	Properties	Domestic waste water
1.	Reaction (pH)	6.82
2.	Electrical conductivity, dsm^{-1}	0.15
3.	Salt concentration (mg/lit.)	96.00
4.	Osmatic pressure (atm.)	0.05
5.	Calcium Ca^{++} (mg/lit.)	24.00
6.	Magnesium Mg^{++} (mg/lit)	17.08
7.	Calcium + Magnesium (mg/lit.)	41.08
8.	Sodium (mg/lit.)	20.70
9.	Carbonates (mg/lit)	120.00
10.	Bicarbonates (mg/lit.)	366.00
11.	Nitrates	Nil
12.	Nitrites	Nil
13.	Sulphides	Nil
14.	SAR	0.78
	Heavy Metals	
15.	Copper	Nil
16.	Lead	Nil
17.	Cadmium	Nil
18.	Nickle	Nil
19.	Iron (mg/lit.)	1.25
20.	Zinc (mg/lit)	0.06
21.	Mercury (mg/lit.)	0.05

Table 2 Periodical studies of domestic waste water.

Date	EC (dSm^{-1})	pH (1.25)
20.3.98	0.81	6.82
28.3.98	0.69	7.90
05.4.98	1.03	7.02
13.4.98	0.80	6.90
21.4.98	0.90	6.91
29.4.98	0.95	6.95
07.5.98	0.99	7.00
15.5.98	1.27	7.50
23.5.98	1.40	7.30
31.5.98	1.65	7.57
08.6.98	1.90	7.63

16.6.98	1.75	7.77
24.6.98	0.56	7.22
02.7.98	0.94	7.70
10.7.98	1.20	6.95
18.7.98	1.33	7.32
26.7.98	0.64	7.62
03.8.98	0.91	7.55
11.8.98	0.76	7.66
19.8.98	0.76	7.70
27.8.98	0.70	7.27
04.9.98	0.69	7.29
12.9.98	0.70	7.30
20.9.98	0.78	7.17

REFERENCES

[1] Kulkarni, S.M., Takale, G.R. and More, S.D., 1998. Sinchanasathi pani parikshanache mahatva. Sinchan Magazine 11 (2) : 19-22.
[2] Panse, R.V. 1998, Nagri sandpanacha sinchanasathi punarvapar, Kalachi Nitant Garaj. Sinchan Magazine 11 (4) : 98-102.
[3] Sankaran, A. 1965. Laboratory manual for Agriculture Chemistry. pp 230-252
[4] Tandon, HLS 1993, Methods of analysis of Soils, Plants, Water and Fertilizers.
Pp. 23-116.