Pak. J. Agri. Sci., Vol. 31, No. 4, 1994

CHEMICAL COMPOSITION OF EFFLUENTS FROM DIFFERENT INDUSTRIES OF THE FAISALABAD CITY

Abdul Ghafoor, Abdul Raur, Muhammad Arif & Waseem Muzaffar
Department of Soil Science,
University of Agriculture, Faisalabad:

In preliminary investigations, it was found that the quality of effluents with respect to EC, SAR and RSC from Kashmir Ghee Mills and Lyallpur Chemicals Ltd. was worse compared to those from other textile units (Nishatabad, Kohi-Noor and Dying units) and cereal grain processing industry (flour Mills and Rafhan Maize Products). Overall, the EC and RSC values of the main Paharang and Maduana drains at Chak No. 217/R.B. and Chak 225/R.B., t'espectively were much higher than the critical levels. The concentration of P was the highest in effluents from Lyallpur Chemicals Ltd. while that of K was the highest in effluent from Rafhan and Flour Mills. The concentrations of Fe, Mn, Cu, Zn, Pb and Ni were well below the safe limits in effluents from all the sources as well as in both the main drains. It seems that if these effluents are managed for EC, SAR and RSC problems, the macro and micro nutrient contents will be of considerable significance for agriculture.

INTRODUCTION

Faisalahad is the third largest city of Pakistan and is well recognised for textile industry. Different industrial units, being voracious consumer of natural resources, have brought in it's wake the environmental degredation of air, water and soil.

The cities, located near the rivers, drain their effluents into rivers directly and partially are also used for agriculture, particularly near big cities of Pakistan including Faisalabad. There is considerable temporal and spatial variation (Ibrahim and Salmon, 1993 a & b, Bhatti *et al.,* 1978) in the chemical composition of the main drain sewage effluents, but the quality of effluents at source has not been considered. Thus it was planned to determine the contribution of different industrial units to the main drain sewage effluent quality in Satiana road and Ghulam Muahmmad Abad areas in the Faisalabad Municipal Limits.

MATERIALS AND METHODS

For the present study, the Paharang and Muduana drains were selected. The section of the Paharang drain under investigation was from Nishat Textile Mills to Chak No. 217/RB Uchbera and Chak No. 124/RB. Marzipura where it's water is diverted for irrigating vegetables. The main industry and effluent sampling sites are shown in Table 1. The section of the Muduana drain from Lyallpur Chemicals Ltd. to Chak No 225/R.B., from where its sewage water is used for irrigating the vegetable crops, was included in the studies. The effluent sampling sites are shown in Table 2.

Composite effluent samples were collected thrice during the months of October to November 1993. Since there was no considerable difference in composition, the results are reported as average of these

three dcterminations. The sewage water samples were filtered, treated with one per cent sodium hexameta phosphate at the rate of one drop per 25 mL sample and were sujbected to determination of EC, pH, Na, Ca, Mg, K, Cl, S04, P, Zn, Cu, Fe, Mn, P and N by methods described by Page *et al.* (1982).

SAR and RSC followed by the Lyallpur Chemicals Ltd. and the lowest those in the Rafhan Maize Products and Walayt flour Mills. The quality of emuents from textile industrial units had been found between the above .two extreme levels. The data indicated that the effluents from the units processing cereal grains for human

Table 2. Chemical composition or sewage effluents in Satiana road area (Madlana draln), Falsalabad.

Determinalion	Lyp. Chern, Lld.	Pak, Mehr Dying Factory	Rafhan Maize Poducts	Kohi-Noor Text., Mills	Ittefaq Dying Factory	Lyp. Ilosiery	Main drain al Chak 225/RB
EC(d5 m·l)	7.85	7.00	2.84	8.80	5.84	10.20	5.39
pH	8.91	7.84	7.17	7.79	7.95	9.30	7.95
SAR	20.25	15.97	6.46	20.12	14,49	32.11	12.66
RSC (rnmol L'I)	36.16	7.65	11,83	15.lJO	17.16	21,00	11,00
a (mmol L")	30.20	29.01	12.14	50.90	29.73	79.16	35.85
SO. (mmol L")	8.90	12.97	1,23	31,10	13,51	25.30	19.75
K (me Lol)	0.82	1.28	3,39	J,(,5	0.85	0.71	0.60
P (mg 1:1)	2.49	1,16	0.35	1,08	0J>1;	1,13	0,19
Fe (mg VI)	I.JIO	0.56	0.49	0.lJO	0.(,')	1,05	0.10
Mn (mg VI)	0.83	0.28	0.23	0.32	0.26	0.29	0.13
Cu (mg L")	0.43	0.50	Traces	0.32	0.05	0.18	Traces
Zn (mg VI)	1.28	0.20	Traces	0.17	0.23	0,45	Traces
Pb (mg Lol)	0.56	0.34	Traces	0,55	Traces	Traces	Traces
Ni (mg L0I)	0.39	0.14	Traces	Traces	Traces	0.02	Traces

RESULTS AND DISCUSSION

Quality as Irriglltion water: The quality of effluents of the Paharang drain was relatively better than those of the Muduana drain, though both are of unfit quality according to different criteria (Muhammed and Ghafoor, 1992), particularly regarding the EC and RSC (Tables 1&2). The effluent from the Kashmir Ghee Mills had the highest EC, consumption could be better to use for irrigation of crops separately, if possible.

Concentration or macro-nutrients: There were considerable amounts of P and K in the effluents from all the sources (Tables, 1&2). However, the concentration of P was the highest in effluents from the Lyallpur Chemicals Ltd. manufacturing single super phopshate using rock phosphate and H2S04 as raw materials. The Kashmir Ghee Mills were also discharging significant

amounts of P. The results revealed that a reasonable amount of P and K could be supplied to crops by using the main drain effluents for irrigation. The possible strategy could be through mixing, blending or cycling with canal or other good quality irrigation waters, which are also necessary to arrest the salinity /sodicity hazards.

Concentration of heavy metals/micro-nutrients: Heavy metals determined were Fe, Mn, Cu, Zn, Pb and Ni (Tables 1&2). Iron was found in higher concentration in effluents from Lyallpur Chemicals Ltd. and Kashmir Ghee Mills than in the other sources. However, in the main drain effluents at points from where diverted for irrigation, the concentrutions are well below the critical levels as reported by James (1971). Hence, it seems that the concentrations found and reported here will be of value in sewage irrigation water and there might not be any immediate concern to their toxicity in soils, crops or their consumers provided managed amnicably to control the other hazards like EC, SA Rand RSC.

On the basis of the data presented, it is concluded that the effluents from cereal grain processing units are better to use separataly for irrigation. Special practices need to be adapted to manage the effluent irrigation hazards associated with high SAR, RSC and EC. Such practices seem enough to arrest the heavy metal toxicity problems, if any, with respect to the soil, crop and animal health.

REFERENCES

Bhattl, M.A.R., M.A. Mian and H. A 1978. The use of sewage effluent broad irrigation and its effects on cr for human consumption. 2nd Ann, Res. Report. Water and Sanitation Agency, Lahore.

Ibrahim, M. and S. Salmon. 1993a. Chemical composition of Faisalabad city sewage effluent. I. Nitrogen, phosphorus and potassium contents. J. Agri. Res. 30: 381-190.

Ibrahirn, M. and S. Salmon 1993b. Chemical composition of Faisalabad city sewage effluent. 2. Irrigtion quality. J. Agri. Res. 30: 391-401.

Jarncs, G.Y. 1971. Water treatment. 4th Ed. Tech. Press, Scotland. p. 175-181.

Page, A.L., R.II. Miller and D.R. Keeny. 1CJH2. Mcl hods of soil analysis. Agron. No. 9. ParI 2. SSSA, WI, USA.

Muhamrncd, S. and A. Ghafoor. 1992. Irrigation water salinity/sodicity analysis (Lab.). p. 3.1-3.28. In:Manual of salinity research methods. IWASRI, Lahore.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]