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CODEN: IAASCA **ORIGINAL ARTICLE**

Impact on Wire Industrial Effluents on Seed Germination Growth of Irrigate Crops (Cercium-79, Gram-RSG888 and Barley-RD 2035)

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ABSTRACT
In the present study, impact of industrial waste water on seed germination and some physiological parameters of irrigate crops were studied. Environmental pollution poses a great health hazard to human beings, animals and plants. Pollution has also adverse effects on the land, water and its living and nonliving components. Industrial wastewater causes accumulation of heavy metals that are toxic in plants and thus affect the plant growth, seed germination, lower crop yield and human health. The adequate dilution of effluents treatment is therefore needed before the disposal and reuse of wastewaters for irrigation purposes. Thus, the sewage, after proper dilutions can be used as a potential source of water for seed germination and plant growth in agricultural practices.
Keywords*: Pollution, Effluent, Heavy metals, Seed germination*

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INTRODUCTION

Environmental pollution poses a great health hazard to human beings, animals and plants. Pollution has also adverse effects on the land, water and its living and nonliving components. Industrial effluents, containing organic and inorganic compounds have strong influence on the development of growth of crop plants. Growing industrial establishments without proper attention on pollution control measures have resulted adverse impact on the local environment in the city like Jaipur (26.9'N 75.8' logitude). Due to availability of various infrastructure facilities several industrial area viz., VKIA, Malviya nager, RICO etc. operate in jaipur. Other advantage of wastewater irrigation includes an important aspect of pollution removal. The pollutants are partly taken up by the plants and partly transformed in the soil without causing any damage. Nevertheless, the use of waste waters for agriculture is marred by several constraints due to various problems like soil salinity, interaction of chemical constituents of the wastes with the uptake of nutrients and changes in soil property and micro flora (Goel and Kulkarni 1994). The accumulation of these heavy metals in plants causes physiological and biochemical changes (Singh et al.1981, Fisher et al. 1981). Out of the metals classified as toxic, lead(Pb), chromium(Cr), mercury(Hg), uranium(U), selenium(Se), zinc(Zn), arsenic (As), Cadmium(Cd), cobalt(Co), copper(Cu), Nickel(Ni) are emitted into environment in quantities that pose risks to human health (Johnson et al. 2007).

Effluents generated from various industries can be broadly classified into two groups such as treated effluents and raw or untreated effluents. Various industrial processes primarily generate raw or untreated effluents. These effluents are high in chemicals, and organic substances, raw effluent that passes through various treatment stages resulting in low concentrations of chemicals is the treated effluent for which treatment plants are normally used. In the case of treated effluents, toxicity could be minimized to the maximum extent that can be used for irrigation purpose (Archival, 1998). The untreated effluents indicating the interference of their metabolic pathway by polluted groundwater (Coulibaly*, et al.,* 2003 and Mirbagheri 2006). It has been reported that the effluents have an inhibitory effect on seed germination and growth performance of wheat cultivars [10], pulses like green gram,red gram, and other crops. Care should be taken before using the industrial effluents and waste waters for irrigation purpose after making proper dilutions / concentrations as per the report of (Nashar 1998) and the engineering

techniques required for broad application of the technology limited the use of bioremediation (Priya,et al., 2005and Ramesh babu,2007).

MATERIAL AND METHODS

Seed germination was studied in the Wire industrial effluents to monitor the seed germination growth. A laboratory experiment was conducted to study the effect of different concentrations (0, 20, 40, 60, 80 and 100 %) of wire industrial effluent on irrigate crops cercium-79, Gram-RSG888 and Barley-RD 2035 from Durgapura, Jaipur .experimental setup was the same as described by respective effluent concentration were provided and incubated for three days at 26±2^{0}Cfor germination. Daily observations were made for seed germinated seeds. After seven days , seedling were harvested: root shoot & seedling lengths and fresh weights were recorded. For dry weights seeds were incubated at 60^{0}C for 24hrs.Data was subjected to statistical analysis. Experimental setup was the same as described by Nawaz *et. al.,*2006.

All samples for laboratory analysis (pH, Acidity, Alkalinity, Total Hardness, Calcium Hardness, DO and TDS) were determined according to Standard Methods for Examination of Water and Waste water (APHA, 1998) .Iron, Lead, Zinc, Sulphate and Chloride were determined using Atomic Absorption Spectrometer .

RESULTS

Table No1: Analysis of Physcio-chemical parameters in Bajrang Wire Effluent Water

S.No.	Parameters	Result
1.	pH	8.3
2.	Acidity	0.3mg/l
3.	Alkalinity	1.2mg/l
4.	Total Hardness	13mg/l
5.	Calcium Hardness	3.01mg/l
6.	DO	5.436mg/l
7.	TDS (Dry- wet filter)	1.5gm 2.87gm

Table No 2: Analysis of Heavy Metals in Bajrang Wire Effluent Water

S.No.	Parameters	Result	Normal standard
1.	Iron as Fe	11.85mg/l	0.12
2.	Zinc as Zn	14.31mg/l	0.6-5ppb
3.	Lead as Pb	1.62mg/l	0.01-0.1
4.	Chloride	554.83mg/l	250
5.	Sulphate	129.37mg/l	150

Table3: Effects of Bajrang wire industry effluent on seed germination (Barley-RD 2035)

S.no	Parameters	0%	20%	40%	60%	80%	100%
1.	Weight(gm) Initial(Wet)	0.5130	0.4740	0.4370	0.4110	0.3020	0.1415
	Final (Dry)	0.1175	0.1030	0.1000	0.0995	0.0965	0.0915
2.	Roots	4.3 ±0.37	3.76 ±0.57	3.2 ±0.13	3.14 ±1.13	3.1 ±0.27	Nil
3.	Shoots	8.3 ±1.31	8 ±1.01	5.7 ±1.06	3.8 ±0.3	1.0 ±1.22	Nil

Table4: Effects of Bajrang wire industry effluent on seed germination (Gram-RSG888)

S.no	Parameters	0%	20%	40%	60%	80%	100%
1.	**Weight(gm) Initial(Wet)**	1.3120	1.032	1.1235	0.8915	0.7085	0.6190
	Final (Dry)	0.5225	0.5115	0.4305	0.4150	0.4090	0.4080
2.	**Roots**	6.84 ±0.56	6.46 ±2.03	5.22 ±1.48	4.18 ±0.56	3.94 ±0.67	0.4 ±0.14
3.	**Shoots**	1.45 ±0.32	1.73 ±0.90	Nil	Nil	Nil	Nil

Table 5: Effects of Bajrang wire industry effluent on seed germination (cercium-79)

S.no	Parameters	0%	20%	40%	60%	80%	100%
1.	Weight(gm) Initial(Wet)	0.5075	0.4955	0.4755	0.4720	0.4180	0.3720
	Final (Dry)	0.1575	0.1510	0.1325	0.1055	0.1130	0.1010
2.	Roots	1.83 ±0.91	1.81 ±0.90	1.72 ±0.86	0.88 ±0.44	0.77 ±0.38	Nil
3.	Shoots	3.92 ±0.71	3.06 ±0.48	2.54 ±0.47	0.62 ±0.27	0.35 ±0.07	Nil

RESULTS

Wastewater was analyzed for the assessment of various parameters. The physicochemical analysis of effluent samples is given in Table 1. The untreated effluent samples were high in certain parameters which are above the permissible limits. Similar studies have been done by Nawaz *et. al.,*2006 and Yasmin et. al. 2011 on various physiochemical characters of industrial effluent. The present effluent samples studied are alkaline in nature except untreated effluent of pH 8.3. Untreated effluent of maximum level of Alkalinity (1.2mg/l), TDS (83400mg/ L) and Acidity (0.3mg/L). Maximum total hardness (13mg/L) and calcium hardness (3.01mg/L) were recorded in untreated effluent of BWI. DO which are indicators of pollution load were recorded maximum in untreated effluent of BWI (5.436mg/L) and TDS found untreated effluent of BWI (1.5gm in dry & 2.87gm in wet filter).

The heavy metals analysis of effluent waste water samples in BWI is given in Table 2. High level of Chloride 554.83mg/l. Maximum Lead as Pb (1.62mg/L) and sulphate (129.37mg/l) were recorded in untreated effluent of BWI. Iron as Fe was found in BWI 11.85mg/l higher of normal standard as well as Zinc as Zn observation 14.31mg/l. some research lead to reduction in absorption of water by the seed/seedling. Some researcher related this delayed germination directly with the presence of salt/meta/ concentrations(Baruah & Das 1997)which is also a result of higher metal ion concentrations (Mukherji &Das 1972) as well stimulatory (Nawaz *et. al.,*2006)effects of various effluents on the germination of a plant species were observed by many researches.

The laboratory experiment on cercium-79, Gram-RSG888 and Barley-RD 2035 showed an inhibitory effect of industrial effluents on seed germination and early growth of these plants (Table 3, 4 & 5). Supply of untreated effluents produced significant inhibition in seed germination and seedling growth parameters – length of root, length of shoot and Initial fresh and final dry weight of seedling in cercium-79, Gram-RSG888 and Barley-RD 2035.

Different concentrations effluents were used in petridish culture experiments to investigate its effect on seed germination and seedling growth in cercium-79, Gram-RSG888 and Barley-RD 2035. The seed germination and seedling growth significantly reduced with the increase in concentration of the effluent. In the present study, germination was significantly reduced in higher effluent treatments but in lower treatments germination was although affected but not completely suppressed as well stimulatory Yasmin et. al. 2011. Similar observations have been made by Hussain, 2010 and Mahmood *et al.* (2005) for seed germination in corn, Jamal et al. (2006a, b, c, d) for seed germination in wheat, Vigna spp and *Prosopis juliflora* and Shafiq *et al.* (2008) for seed germination of *Prosopis. juliflora*. The fresh matter was found significantly increased in barley, while other higher dilution levels reduced it. Dry weight was found consistently reduced or unchanged in different treatments. Increase in percentage germination in treated effluent may be due to lower salt concentration that has created favorable environmental conditions for germination and utilization of nutrients present in the effluent.

Davies and Linsey (2001) reported grain yield reduction of 69% and 78% in two wheat cultivars due to effluent irrigation. In another study, Turner (2002) reported that effluent caused severe growth reduction in crops, particularly in cereals with marked depression in biomass (50 - 70%).

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