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Effect of Polluted and Non-Polluted Water On The Vegetative Growth of Cereal Crops

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Abstract

Polluted water can be a good source of nutrients to meet crop water requirements in areas facing water shortage problem. Use of polluted water directly causes hazardous for soil environment due to the high concentration of pollutants. Toxic effect of polluted water can be reduced by dilution of these pollutants. Polluted water can be diluted with the help of treatment plant which is lying near the fields of wheat and rice, with which these fields of wheat and rice are irrigated. But after treatment of polluted water, this can be used for irrigation in areas facing water scarcity after treatment inhibitory effect of growth parameters can be reduced significantly.

Keywords- Polluted water, Crop Production, Water Scarcity

Introduction

Due to polluted water loss in growth of crop plants due to inhibitory effect of these pollutants in polluted water. Farmers use chemicals to hinder bug infestation or diseases from damaging or ruining their crops. These also cause major pollution in water sources, because these seep into groundwater on runaway into rivers or lakes. Environmental pollution caused by the release of the wide range of pollutants or compounds due to industrialization are major factors responsible for low productivity of crops (Konwar and Jha ,2010). Polluted water contains heavy load of pollutants exhibiting high (TDS), total suspended solids and many other organic and inorganic compounds (Siddique *et al* ,2010). Untreated waste water having heavy metals BOD, COD exceeds than permissible limits for irrigation. If rice plants are irrigated with contaminated water having bioaccumulation factors for cd, Zn, Pb, Cu, Mn are higher than normal. Increased pollution of the soil due to continuous use of heavy metals contaminated by industrial effluents critical to crop production and growth. Mainly arsenic, mercury, cadmium, lead and uranium are toxic to plants. These metals accumulate in soil and plants in excess and enter food chain (Stolt *et al*., 2006, Jameli*et al*.,2007). Treated and diluted poluted water increased plant height, root

shoot length while polluted effluent water causes inhibitory effect on plant growth due to nutritional uptake is redused results in sharp decline of yield (Wins and Murgan, 2010)

Material and Method

Soil is taken from the fields of wheat and rice of different farmers under experimentation of Gehri Bhagi village, near Bathinda region of Punjab. Physico-chemical properties such as pH, EC, N, P, K was determined by KVK laboratory located in Bathinda district. Canal water is taken as control. After sowing to the fields of different farmers, vegetative growth of plants will be taken with the help of measuring tape, replication of crops in different fields of farmers will be done to collect proper data of these crops in different fields of farmers.

Results and Discussion

Untreated discharge of polluted water affects the quality of drinking water. (Kaur *et al*., 2010), but also caused much damage to the environment (soil and water) by adding pollutants (WHO,2002, Wins and Murgan, 2010, Kaur *et al*., 2010)

Polluted water has the possibility for proper treatment (Khan *et al*., 2011). Sewage water also has essential nutrients, small landholders can use this water for irrigation purpose in dry areas (Girsha and Raju, 2008, Shah, 2009). due to toxic elements in polluted water, these limits its applications for irrigational purposes (Khan *et al*., 2003). Contamination of soil by heavy metals is now widespread (Al Naggar *et al*., 2013). Land degraded by heavy metals also harms the environment and ecosystem worldwide (Li *et al*., 2013, Chen *et al*, 2015). Heavy metals in polluted water are poorly soluble in soils and plants that are growing results in contamination of food that are hazardous to humans and animals (Jolly *et al*., 2013) (Chibuik and Obiora, 2014), Due to mining, smelting, manufacturing and agricultural fertilizers and pesticides (Morgan 2013, Chibuike and obiora, 2014)

Treated polluted water can impart positive effects (Rehman *et al*., 2009). Thus, for beneficial cultivation farmers can use pollutes water for irrigation with a low concentration of Zn, Fe, Mn and Cu contents in rice seedlings increased as compared to a good quality irrigation water. Polluted water has essential nutrients like copper, zinc, ironand manganese(Beghum *et al*., 2011).

Considering the above points, this study was undertaken to evaluate the effects of treated water and more polluted water on wheat and rice, vegetative growth. The objective is to find what type of polluted water helps improve the growth of wheat and rice.

Results revealed that all the growth, physiological, chemical parameters of wheat and rice were negatively affected on applications of polluted water. Growth of wheat and rice negatively affected on application of polluted water. Root, shoot length and root, shoot mass was decreased as compared to control (canal water) in polluted water. Reduction in growth parameters with polluted water due to large amount of toxic substances (elements),toxic organic compounds,high BOD and COD. (Patecal *et al.*, 1999). Adverse effect of polluted water on root mass might be either due to excessive toxic substances (Bhatt and Singh, 2003, Shah, 2009). Moreover, irrigation with polluted water imparts negative effect on growth parameters due to increase in soil salinity and concentration of toxic metals while after treatment concentration of toxic elements decreases (Kumar et al., 2006) and reduces inhibitory effect on plants of wheat and rice (Kumar et al., 2006 and Rehman et al., 2009). Similar effects are also reformed on other rice varieties (Mistry and Chatterjee,2009).

Application of treated polluted water increases nutrient concentration in soils plant can uptake more nutrients. Table shows that treated polluted water having greater root shoot length. Greater root shoot fresh weight and root shoot dry weight. This may be due to non-inhibitory effect on wheat and rice plants. Treated polluted water may show positive effect due to beneficial nutrients added from this treated water, this treated water may increase the soil fertility.

(a.) Physiochemical characteristic of soil irrigated with canal water (non polluted) and polluted water.

Sr. No.	**Type of Waters**	**Length (cm)**		**Fresh Weight (gm)**		**Dry Weight (gm)**	
		Root	**Shoot**	**Root**	**Shoot**	**Root**	**Shoot**
1	Canal Water (Control Water)	155	170	42	47	20	94
2	Polluted Water	115	122	22	27	6	90
3	Treated Polluted Water	180	1190	50	60	24	98

(b.) Effect of polluted water on the vegetative growth of Wheat (*Triticum aestivum*)

Sr. No.	**Type of Waters**	**Length (cm)**		**Fresh Weight (gm)**		**Dry Weight (gm)**	
		Root	**Shoot**	**Root**	**Shoot**	**Root**	**Shoot**
1	Canal Water	154	172	40	48	22	110

	(Control Water)						
2	Polluted Water	110	123	20	28	7	91
3	Treated Polluted Water	188	196	58	66	26	103

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