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COMBINED IMPACT OF SEWAGE AND INDUSTRIAL EFFLUENT ON WHEAT IN MARH BLOCK, JAMMU (J&K).

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Abstract: The increasing reuse of low concentration sewage and industrial effluent in agriculture not only promotes sustainable agriculture but also preserves scare water resources and maintain environmental quality. In present study the impact of combined sewage and industrial effluent was studied on wheat in Marh Block Jammu (J&K). The observations revealed insignificant ($p>0.05$) stimulatory effect on shoot length, root length, no. of nodes, no. of leaves no. of grains on panicle, dry wt. of panicle, dry wt. of grains, avg. weight of grains during Ist year study period and no. of grains, dry wt. of whole plant and avg. weight of grains during 2nd year study period. Whereas significant stimulatory effect was observed on dry weight of whole plant during 1st year study period and shoot length, root length, no. of nodes, no. of leaves, dry wt. of panicle, dry wt. of grains during 2nd year study period.

Key words : Combined Sewage and industrial effluent, irrigation, Wheat crop, growth and yield.

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Introduction

Water is vital to all forms of life and make up 50-90% of the weight of all the plants and animals and about 70% of human body, and plays an important role in various sectors like agriculture, manufacturing, transportation and other human activities etc. But it is the most poorly managed resource in the world. Water pollution occurs due to addition of large amount of toxic materials. The major cause of water pollution can be classified as municipal, agricultural and industrial wastes. Industrial waste water usually contains specific and readily identifiable chemical compounds. Irrigation sector marks the largest volume of water use in the world in terms of fresh or waste water. Effluents are reused for irrigation purposes in many countries around the world on all the populated continents.(USEPA, 1992).

The irrigation needs of agricultural crops could be catered with waste waters which can prevent environmental hazards, serve as additional potential source of fertilizer for agricultural use and reduces the amount of water that needs to be extracted from environmental water sources. (USEPA 1992, Geogory 2000, Meli et al 2002, Ramirez-Fuentes et al. 2002). In present study attempt has been made to study the impact of combined sewage and industrial effluents on growth and yield of Wheat.

Material and Method

The study area for the purpose of investigation was divided into two sites:-

Site 1 : Reference Site (Parwah) :- At this site wheat is irrigated with ground water (Tube-well) having no contaminants of combined industrial and sewage effluent.

Site 2 : Polluted Site (Dai Chak): At this site wheat is irrigated with combined sewage and industrial effluent.

During sampling 30 plants from each site were uprooted randomly along with roots from the ground at the time of harvesting and were collected in Polythene bags. The stem and roots were properly washed with water so as to remove soil attached to them and then were air dried for 2-3 hrs. Shoot and root length of each plant was measured using thread and geometric scale. No. of leaves, nodes and total no. of grains attached to the each plant were also calculated. The plant samples were sun dried for 72 hrs. Using Precisa balance the dry weight of each of whole plant (in gm), dry weight of panicle (in mg), and dry weight of all the grains of panicle of each of 30 plants (in mg) were also calculated. Finally the average weight of grain per plant and per 30 plants was calculated.

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Observation and Discussion (Table I ;Figs.1-4)

The analysis of data revealed that combined sewage and industrial effluent exhibited insignificant ($p>0.05$) stimulatory effect on shoot length, root length, no. of nodes, no. of leaves and significant ($p<0.05$) stimulatory effect on dry weight of whole plant of wheat during first year study period. The significant ($p<0.05$) stimulatory effect on shoot length, root length, no. of nodes, no. of leaves and insignificant stimulatory effect on dry weight of whole plant was observed during 2nd year study period. This observation is contradictory to the work of Raju *et al.* (2015) who observed that industrial effluent inhibited the seedling growth of root and shoot of wheat and rice. Ali *et al.* (2015) also reported inhibitory effect of industrial effluent on the crop plants and they suggested that irrespective of the nature, the industrial effluent could be utilized for agricultural crops on proper dilution so as to reduce the lethality of pollutants.

The analysis of data on the yield of wheat after irrigation with combined sewage and industrial effluent revealed insignificant ($p>0.05$) stimulatory effect on the no. of grains on panicle, dry weight of panicle, dry weight of grains, average weight of grains during first year study period.

During 2nd year study period the combined industrial effluent was observed to exhibit insignificant ($p>0.05$) stimulatory effect on no. of grains on panicle and average weight of grains and significant ($p<0.05$) stimulatory effect on dry weight of panicle and dry weight of grains. This observation supports the work of Pandey and Singh (2015) who reported that fertilizer industrial effluent have a manuarial potential for better crop productivity. Dash (2012) reported that sewage after proper dilution can be used as a potential source of water for seed germination and plant growth in agricultural practices. Al-Dulaimi *et al*. (2012) also reported that industrial waste water could be well utilized for betterment of agricultural crops in proper dilution to reduce the lethality of pollutants.

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Table 1: Impact of combined industrial and sewage effluents on growth and yield of Wheat.

S.No.	Parameters	Ist Year (2015)		2nd Year (2016)	
		Reference Site	Polluted Site	Reference Site	Polluted Site
1	Shoot length(cm)	74.5±10.02 (49-87)	74.55± 8.6 (59-90)	62.5± 13.5 (39-87)	72.1± 14.7 (43-92)
2	Root length(cm)	14.2± 3.3(7-20)	15.75± 3.8 (9-23)	9.5± 3.4 (5-17)	12.3± 3.7 (6-18)
3	No. of Nodes	4.2± 0.7 (3-5)	4.35± 0.8 (3-6)	4.05± 0.9 (2-5)	4.7± 0.7 (3-6)
4	No. of leaves	4.05± 0.9 (1-5)	4.1± 0.9 (3-6)	3.8± 0.8 (2-5)	4.4± 0.7 (3-6)
5	Total no. of grains on the panicle	58.1± 11.2 (42-80)	63.6± 10.04 (42-78)	55.6± 15.09 (32-80)	64.4± 16.4 (44-95)
6	Dry weight of whole plant (gm)	9.1± 1.4 (7.2-12.5)	10.23± 1.5 (7.5-12.5)	7.8± 2.3 (4.5-14.9)	8.2± 1.9 (6.7-12.9)
7	Dry weight of panicle (mg)	1958 ± 330.08 (1720-2810)	2152.5± 305.3 (1435-2542)	1840.2± 495.8 (1123-2781)	2202.2± 573.6 (1482-3281)
8	Dry weight of grains (mg)	1735 ± 328.39 (1560-2650)	1917.4± 303.2 (1213-2314)	1633.1± 431.5 (962-2411)	1960.3± 507.5 (1322-2891)
9	Average weight of grain	29.85 ± 0.60 (28.48-31.12)	30.13 ± 0.37 (28.8-30.71)	29.42 ± 0.6 (28.26-30.82)	30.38 ± 0.59 (29.37-31.57)

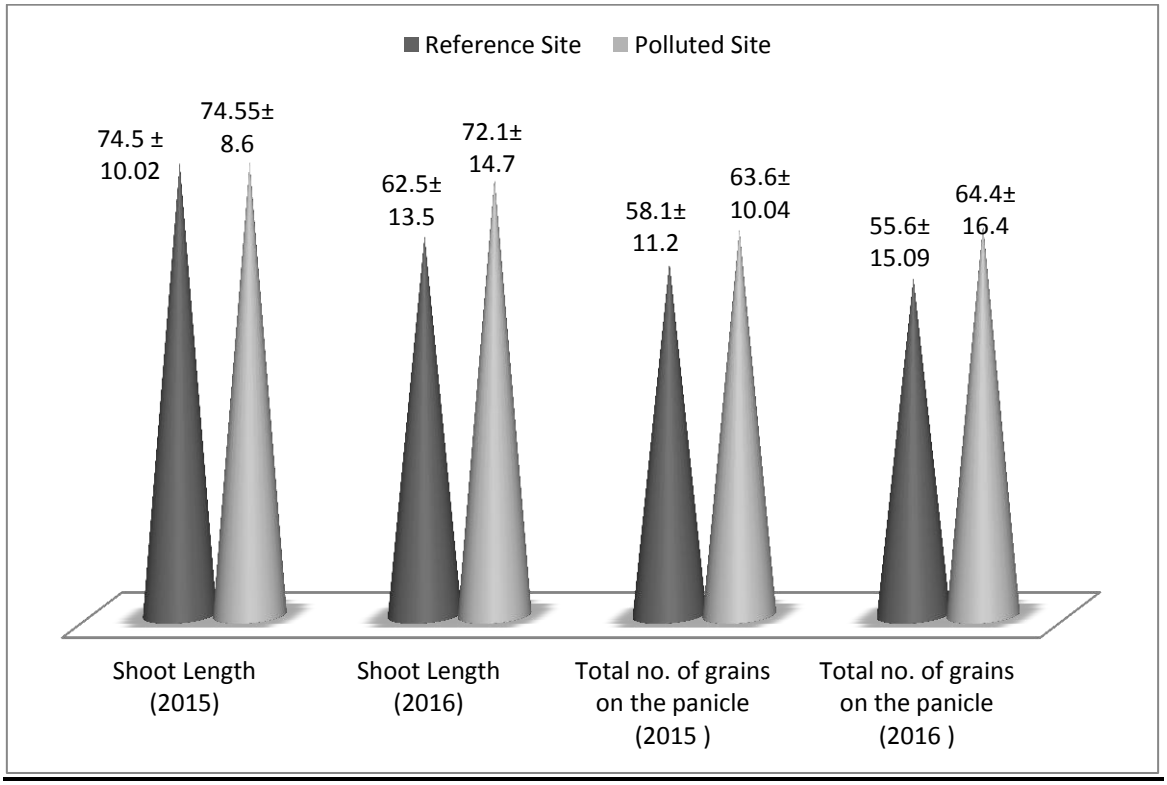

Fig. 1:Impact of combined industrial and sewage effluents on growth and yield of Wheat.

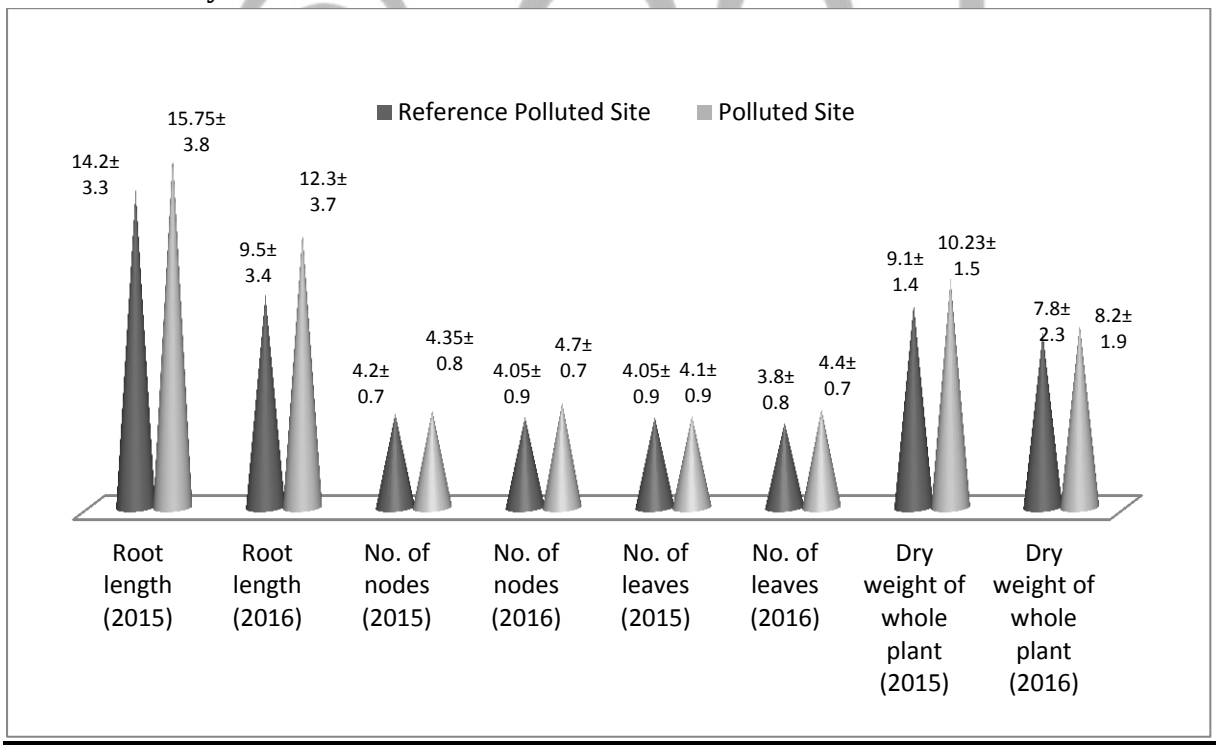

Fig. 2:Impact of combined industrial and sewage effluents on growth of Wheat

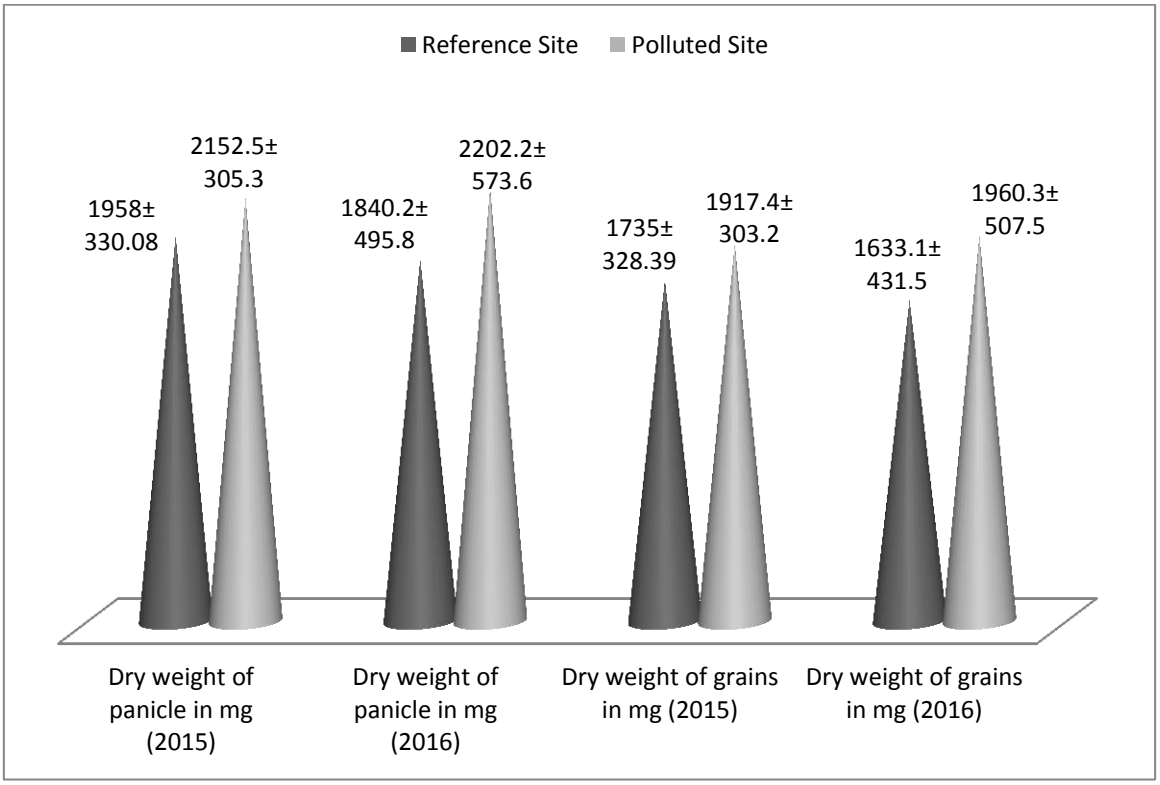

Fig.3:Impact of combined industrial and sewage effluents on yield of Wheat

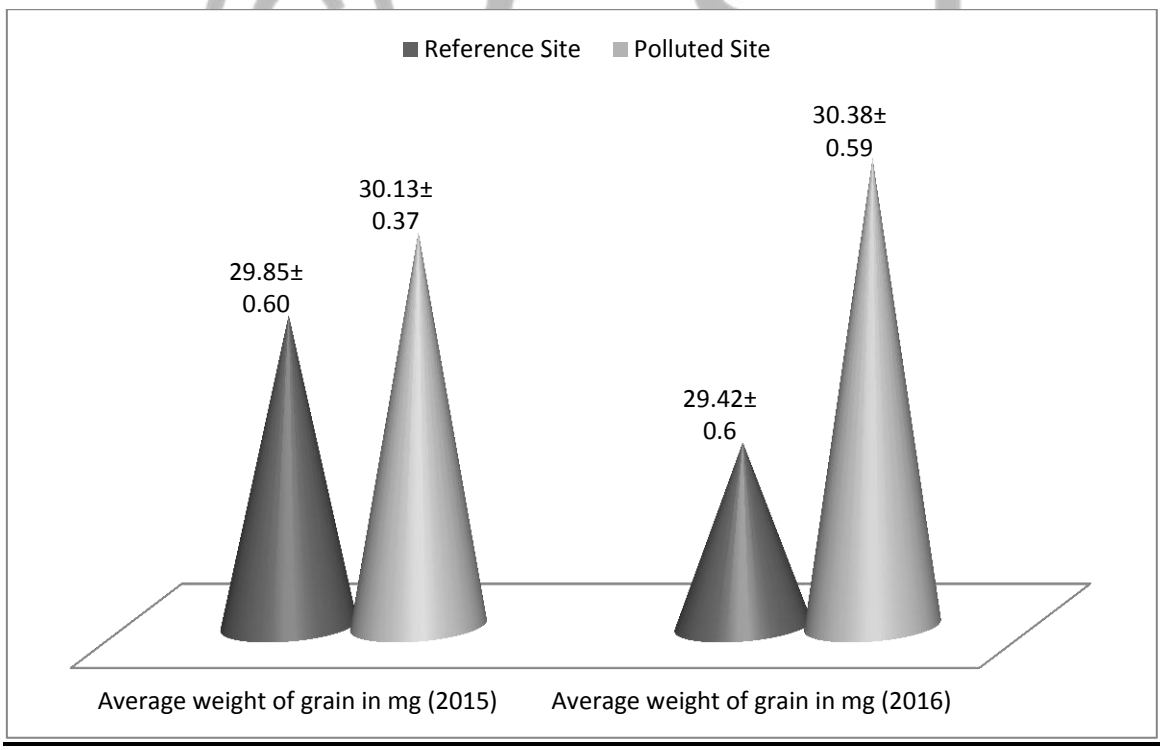

Fig.4: Impact of combined industrial and sewage effluents on yield of Wheat