Indian J.Sci.Res.1(2) : 87-89, 2010

EFFECT OF INDUSTRIAL EFFLUENT ON SEED GERMINATION AND SEEDLING GROWTH OF *Hordeum vulgare* L. (BARLEY)

HARI SHANKER RAIA[a1] AND KHALID KAFEEL KHAN[b]

Department of Botany, S.N.P.G. College, Azamgarh, U.P., India.
[a]E-mail : harishanker1950@yahoo.in
[B]E-mail: kafeel1864@gmail.com

ABSTRACT

The present investigation reveals the pollution effect on *Hordeum vulgare* Barley, a rabi crop plant widely cultivated in India. It is either grown pure or a mixed crops. Its sowing place between October and December and harvesting betwen February and April. The investigation has been focused on primarily on seed germination and seedling growth of Barley under the different concentration of effluent produced by industrial area of India, situated at Satharia, Jaunpur (U.P.). The chemical composition of effluents contains higher concentration of organic matter (54% dry weight), N(2.5%), P(686.2 mg/Kg), K(198.2 mg/kg) and heavy metals (Fe, Cu, Zn, Mn) are found in the effluents.

KEY WORDS : Industrial, effluent, seed, germination, barley

The various mills and industries situated close to rivers, conveniently discharge their effluents into water bodies without any consideration of the consequences. Soil and water contaminated with heavy metals pose a major environmental and human health problem that seeds an effective and affordable technological solution. Kevekordes (2001) found that Ammonium did not affect fertilization but had a significant effect germination at 48 h and cell division at 72 h with most damage occurring in the first 48 h. Mohammad (2006) concluded that by using animal manure combined with chemical fertilizer, the yield and quality of wheat will manure combined with chemical fertilizer, the yield and quality of wheat will increase. Rahmani (2007) found that Utilization of non-prime waters in arid regions is necessary to supplement water resources. Joshi and Palni (2005) have found that greater sensitivity of Hordeum himalayens. Schult to increaseing temperature causes reduction in its cultivated area. Chaturvedi (2005) has found that effect of Nitrogen Fertilizers on Growth, Yield and Quality of Hybrid Rice (*Oryza sativa*) increased significantly. Niroula (2003) has studied of Himalaya Soap and Chemicals of Birtanagar showed toxic lethal effect on Rice and Black gram. This industrial area is situated in the visinity of Varuna lake from where Varuna river originates.

MATERIALS AND METHODS

Effect of Pre-Radicals Emergence Treatment of Efflunece on Germination

For this experiment, seed of test plant were pre-treated in the effluent collected from three sites separately.

Site - A	Effluent from discharge point
Site - B	100 Meter away from site- A
Site - C	200 Meter away from site- B

Seeds of pre-treatment sets were imbibed for their full-imbibition period in the industrial effluent. For control set seeds were imbibed in distilled water for their whole imbibition period. There after, seed were washed with water and transfered to distilled water moistened filter paper in petriplates for germination in dark. Seeds were allowed to germinate at temperature in laboratory conditions. The seeds with 10 mm length of radicle were considered as germinated seeds. The imbition period for *Hordeum vulgare* was 12 hours.

Selected effluents from site - A, B and C were used for the study of seed germination. The maximum inhibition in seed-germination was in site- A treated seeds where as minimum in site -C treated set.

The inhibition in seed germination in effluent site - A, site - B and site - C was 25%, 17% and 10% respectively in *Hordeum vulgare.*

[1]**Corresponding author**

Effect of post radical-emergence of effluent on germination and seedling growth

For post radical emergence treatment seed were firstly imbibed in distilled water for 12 hours, After the emergence of radical, seeds were transferred to the effluent of various sites - A, B and C for seedling growth studies for this seeding were dissected into plants i.e. radical and coleoptile after 6th day and their length were measured. The length of radical was 72%, 35% and 25% of control in site - C, site - B and site - A effluent respectively. Coleoptile length was 90%, 60% and 20% of control respectively.

So it was observed that with increasing the effluent concentration there was a decrease in length of seedling parts-maximum inhibition is seedling growth was observed in the site - A effluent treated set.

Post Radical Emergence Treatment of Effluents on Seedling Growth of *Hordeum vulgare* C. V. Ratna

Parameter	Day after Radicle Emergence			
	4			
Organ	Effluent from Different Sites			
Length	Control	Site - C	Site - B	Site - A
Radicle	3.40	2.92	0.87	0.67
Coleopties	2.83	2.68	1.55	0.44

Parameter	Day after Radicle Emergence			
	6			
Organ	Effluent from Different Sites			
Length	Control	Site - C	Site - B	Site - A
Radicle	5.61	4.04	1.95	1.03
Coleopties	4.41	3.97	2.64	0.87

Parameter	Day after Radicle Emergence			
	4			
Organ	Effluent from Different Site			
Length	Control	Site - C	Site - B	Site - A
Radicle	7.85	5.96	3.29	2.74
Coleopties	8.41	7.90	5.69	2.01

Effect of Phasic Pretreatment of Effluent on Germination and eedling growth of *Hordeum vulgare C. V. Ratna*

From above observations it was found that effluent is inhibitory for seed-germination and seedling growth. So it was of interest to observe whether whole imbibition period is responsible for inhibition or a particular period. For this investigation the entire imbibition period was divided into six equal regimes of two hours. Each regimes was of 2 hours as the whole imbibition period for *Hordeum vulgare* is of 12 hours. The control as well as phasic pretreated seeds were washed with water and allowed to germinate on distilled water moistened filter papers kept in petriplates for seedling growth studies. After 6th day of radical emergence seedlings were dissected into different parts and their length were measured. The site - C used showed no significant effect on seedling growth.

Phasic Pretreatment Effect of Effluents on Seedling Growth in *Hordeum vulgare* C. V. Ratna

Parameter	At the 6th Day, Length						
	Effluent from Site - A (Discharge Point)						
H.vulgare	Regimes						
Length	Control	I	II	III	IV	V	VI
Radicle	6.60	5.94	5.80	5.28	3.29	4.35	4.94
Coleopties	7.46	7.31	7.16	6.71	5.22	5.59	5.96

RESULTS, DISCUSSION AND CONCLUSION

The observations indicate that the effluent starts to exert its from the begining of plant life i.e.; germination and seedling growth.

The observation on promotion and inhibition of seed-germination and seedling growth respectively by lower (site-C) and higher (site-A) concentrations of industrial effluent shows that the lowest the concentration of effluent, lower the inhibitory effect was detected and the phasic pretreatment studies indicate that there is inhibition of seedling growth in all the phases treated set however, maximum inhibition in seed-germination has been reported in mid phase (regime-4) treated set and minimum in (regime-1) initial phase treated set. In rest of the phasic treatments (regimes-2, 3, 5 and 6) inhibition in seed germination is in between the initial and mid phase.

Thus the present investigation and earlier observation from other research laboratories have clearly indicated the hazardous effect of effluent. However, very

low concentration of effluent is apparently harmless. Indeed, irrigation by effluent is harmful because due to this practice there occurs accumulation of pollutants in the edible part of plants and through food chain reach in consumers and cause several harmful effects.

ACKNOWLEDGEMENTS

The authors wish to thank Dr. Naveen Krishna Srivastava, Sr. Lec. Department of Botany, S.D.J. (P.G.) College, Chandeshwar, Azamgarh, for his untiring help and assistance in the preparation of the manuscript of this paper.

REFERENCES

Rahmani H. R.;2007. Utilization of non-prime water in arid regions. Scientific Research and Essay, **2 (3) :** 84-88.

Chaturvedi I. ; 2005. Effect of nitrogen fertilizers on growth, yield and quality of hybrid rice (*Oryza sativa*). Journal Central European Agriculture, **6 (4)** : 611-618.

Joshi S. C. and Palni L. M. S.;2005. Sensitivity of *Hordeum himalayens* Schult to increasing temperature causes reduction in cultivated area. Current Science, **89(5)** : 10-12.

Kevekordes K. ;2001. Ammonium did not affect after fertilization but a significant effect on germination of crop plants. Biological Sciences, **219 :** 139-148.

Mohammad L ;2006. Effect of animal manure combined with chemical fertilizer on yield and quality of wheat. Proc. 13th Australian Agronomy Conf.: 10-15.

Niroula B. ;2003. Effluent of Himalaya soap and chemical of Biratnagar showed toxic lethal effect on Rice and Blackgram. Our Nature, **1 :** 10-14.