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EFFECT OF Ni AND Cr PLATING INDUSTRY EFFLUENTS ON SEED GERMINATION AND SEEDLING GROWTH OF *Pissum sativum* c.v. *azaad*

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ABSTRACT

Ni and Cr are heavy metal pollutants. These toxic heavy metals are not needed by the plants. So it was of interest to study the influence of the heavy metals on germination and seedling growth. Seeds of test plants were sterilized with 0.1% $HgCl_2$ solution and washed with distilled water. Seed were allowed to germination on filter paper moistened with different site effluents Ni and Cr separately. Is was reported that above concentration of both the heavy metal (Ni and Cr) was inhibitory for seedling growth of *Pissum sativum* c.v.*azaad*. However it was observed that Cr was more inhibitory than Ni.

KEYWORDS : *Pissum sativum*, Heavy Metal, Test Plant

Rapid progress in science and technology has been of great advantage to human being , but environment pollution has become its by product. The improper management of atmosphere, hydrosphere and the lithosphere resulted into adverse effects on plants and animals. Pollution due to industrial waste in increasing and its is a problem thought the world. The influents contains various organic and inorganic contents in different concentration which are required by the plants (Kumar 1978). Some of the industrial effluents after certain dilution are found to be beneficial for irrigation purposes. On the other hand some trace elements like arsenic, cadmium, and mercury are presents in sugar industry effluents which proved to be injurious to plants health (Lapa et al., 1963).

Chromium and Nickel are widely used in electroplating to manufacture imitation armaments, parts of automobiles, oven, and several articles of domestic and commercial use. Excessive use of above indicated heavy metals foe electroplating as caused pollution of soil and water.

All concentration of chromium used were found inhibitory to seedling growth. The extents of inhibition increases with increasing concentration of chromium (Singh and Singh 1993) concentration of nickel chlorides (1x10.3m) was inhibitory to used germination of *H. vulgare* ev. K-125 and the effluents containing chromium was reported inhibitory for seed germination. (Mishra and Ambasth, 1990).

MATERIALS AND METHODS

As such it inspired us to search out the impact of effluents of Cr and Ni plating industries on seed germination. For study uniformly selected of the *Pissum sativum* c.v. *azaad* were sterilized with 0.1% Hgcl2 solution and washed with distilled water. The seed were imbibed in different effluents collected from Site-1, Site-2 and site-3 of Cr and Ni plating industries for their specific imbibitions period along with control sets (seed imbibed in distilled water for there specific imbibitions period). There after seed were washed with water and transferred to distilled water moistened filter paper in patriplates for germination in dark. Seed were allowed to germinate at room temperature in laboratory condition. The seed with 2mm length of redicle were considered as germinated seed the imbibitions period for test plants was 20 hrs.

Effluents from three sites of Cr and Ni plating industry were used for the study of seed germination.

Site-1 factory effluents collected from discharged point.

Site-2 factory effluents collected from 100m. Away from discharged point.

Site-3 factory effluents collected from 200m. Away from discharged point.

The maximum inhibition in seed germination was reported in site-1 treated seed where as is was minimum in site-3 treated seeds. In site-2 Cr and Ni plating effluents used the inhibition in germination was in between the site-1 and site-3 treated sets. The inhibitions was in seed germination in site-1, site-2 and site-3 Cr plating effluents was ca. 30%, 20%, and 5% respectively and the inhibition was in seed germination is site-1, site-2 and site-3. And Ni plating effluents was ca. 23%, 14%, and 06% respectively in *Pisum sativum* c.v.*azaad*. (Table, 1)

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Table 1 : Germination Percentage Inhibitions

Three sites of Cr. plating effluents				
Test plant	Control	Site - 1	Site - 2	Site - 3
Pisum sativum c.v. azaad	6%	30%	20%	5%
Three sites of Ni. plating effluents				
Test plant	Control	Site - 1	Site - 2	Site - 3
Pisum sativum c.v. azaad	6%	23%	14%	6%

Table 2 : Effect of Cr Plating Effluents Pretreatment to Seed on Seed Germination and Growth in Dark Grown Seedlings of *Pisum sativum* c.v. *azaad*

Parameter Organ	Days after radicle emergence											
	3				5				7			
	Sites of Cr plating effluents											
	Control	S-1	S-2	S-3	Control	S-1	S-2	S-3	Control	S-1	S-2	S-3
Germination	90%	35%	71%	91%	-	-	-	-	-	-	-	-
Radicle (cm)	4.10	2.25	3.15	5.70	5.90	4.00	8.90	9.90	10.0	7.0	11.15	12.25
Epicotyl (cm)	2.50	1.15	2.25	3.10	4.0	2.25	3.50	4.50	7.20	4.7	6.15	9.00

Table 3 : Effect of Ni Plating Effluents Pretreatment to Seed on Seed Germination and Growth in Dark Grown Seedlings of *Pisum sativum* c.v. *azaad*

Parameter Organ	Days after radicle emergence											
	3				5				7			
	Sites of Ni plating effluents											
	Control	S-1	S-2	S-3	Control	S-1	S-2	S-3	Control	S-1	S-2	S-3
Germination	90%	40%	80%	91%	-	-	-	-	-	-	-	-
Radicle (cm)	5.25	3.25	4.00	5.50	6.00	5.00	8.00	9.00	11.0	7.5	11.00	12.00
Epicotyl (cm)	2.75	1.25	2.50	3.00	4.5	2.50	4.00	5.00	8.50	5.00	6.50	9.25

Effect of Cr and Ni Plating Effluents on Dark Grown Seedling

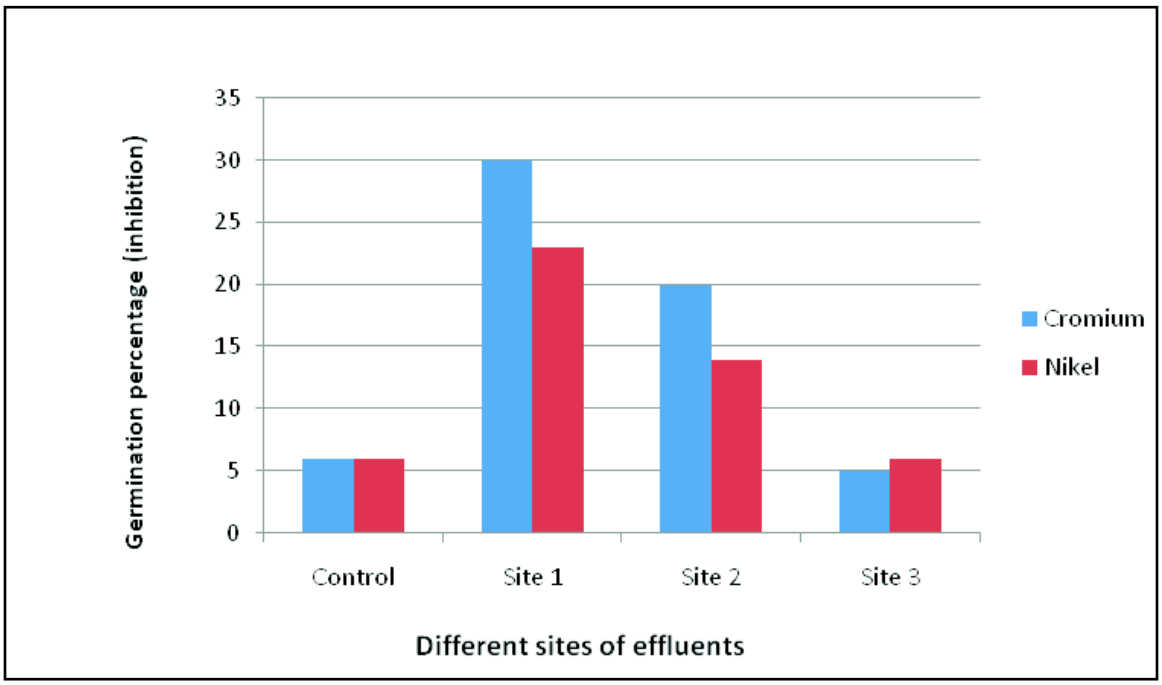
The effect of three sites of Cr and Ni plating effluents on seedling growth. For pretreatment studies seed were soaked in effluents of three site of Cr and Ni plating industry for required imbibition period. After pretreatment seeds were thoroughly washed with water and there transferred to distilled water moistened filter papers in petridishes for seedling growth in dark at room temperature in laboratory conditions. Seedling growth was studied in terms length measurement of seedling parts. Three site and cultivars were chosen for seedling growth studied at 3rd , 5th and 7th day after emergence of redicle. The site-3 Cr and Ni plating effluents was ineffective for inhibition of seedling growth, however site-1 and site-2 containing Cr and Ni plating effluents used were inhibition for seedling growth, maximum inhibition in this regard was reported site-1 containing Cr and Ni plating effluents. (Table, 2 and Table, 3).

RESULTS AND DISCUSSION

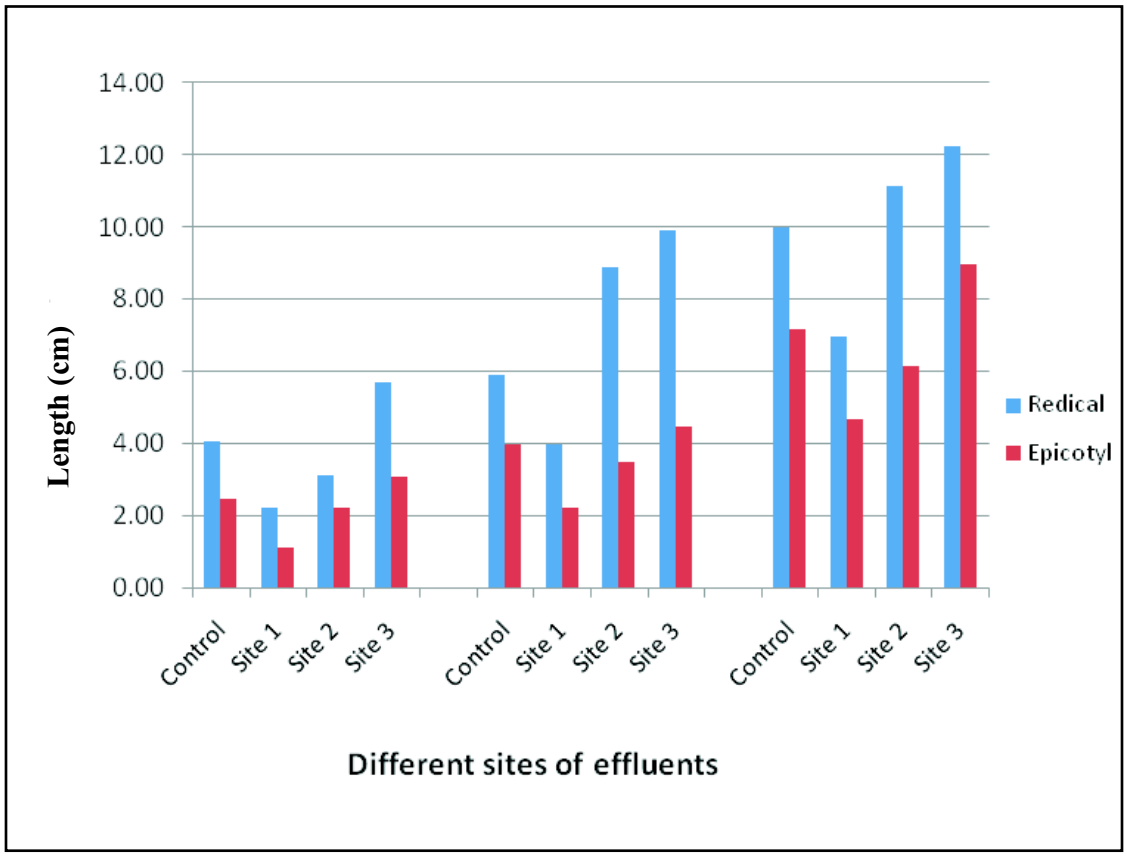
The present investigation was undertaken to assess the impact of three sites (site 1, site 2 and site3) of Cr and Ni plating effluents separately on seed germination and seedling growth studies. (Graph,1) Based on dose response curve obtained studies one promontory and an industry site of Cr and Ni containing effluents were selected. Pretreatment as well as post redicle emergence, treatment with three site of Cr and Ni plating effluents are inhibitory for seed germination and seedling growth with maximum inhibition in the site-1 treated set and site-3 treated set of above effluents showed promontory effect for seed germination. (Graph, 2 and 3)

Our observation on seed germination and seedlings growth indicate that Cr and Ni plating effluents in inhibitory to seed germination and seedling growth with maximum inhibition in site-1 treated set.

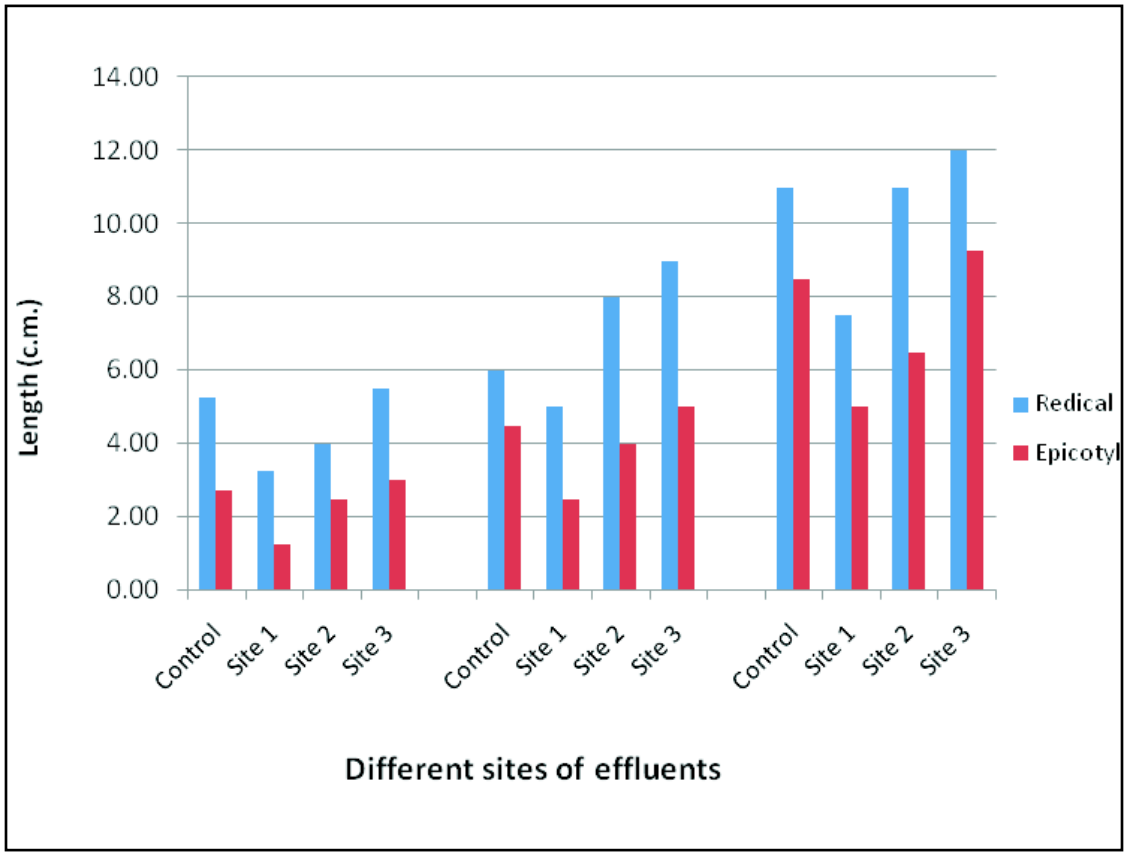
Chromium effluents in more inhibitory for germination and seedling growth of test plants than nickel effluents.



Graph 1: Germination Inhibition Percentage of Cr and Ni



Graph 2 : Effect of Cr Effluents on Length of Seed Germination



Graph 3 : Effect of Ni Effluents on Length of Seed Germination

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