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COMPARATIVE STUDY OF Cr PLATING INDUSTRY EFFLUENT ON SEED GERMINATION AND GROWTH OF *Cicer arietinum* cv. G-130 AND *Cicer arietinum* cv. H-208 CROP PLANTS

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ABSTRACT

Effect of different sites of Chromium plating industry effluents on germination and growth of *Cicer arietinum* cv. G-130 and *Cicer arietinum* cv. H-208 leguminous crop plants was studied. The maximum inhibition in seed germination and growth was reported in treated seeds, where as it was minimum in II treated seeds. Among two cultivars of *Cicer arietinum* cv. H-208 is more susceptible to chromium plating effluent toxicity than cv. G-130 in this way differential responses are shown by above stated genotypes of *Cicer arietinum* to chromium plating effluent toxicity.

KEYWORDS: Chromium, *Cicer arietinum*, Germination, Effluent and Genotypes

Rapid progress in science and technology has been of great advantage to human beings but environmental 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 is increasing and it is a problem throughout the world. The effluent contains various organic and inorganic contents in different concentration which are required by the plants (Kumar J., 2004). Some of the industrial effluents after certain dilution are found to be beneficial for irrigation purpose (Singh and Singh, 1992). Side some trace elements like arsenic, cadmium and mercury are present in sugar industry effluents which proved to be injurious to plant health (Beckett and Davis, 1977).

Chromium does not occur as a contaminant of concern in plant tissues except at site specific discharge points the algae are generally susceptible to the toxicity and accumulation of chromium. The effect of Hg. Pb and Cd on barley (*Hordium vulgare*) it was reported that all the three heavy metals showed adverse effects on germination and seedling growth of the plants (Beg *et al.*, 1994).

Chromium are widely used in electroplating to manufacture imitation, ornaments, parts of automobiles, oven and several articles of domestic and commercial use. Excessive use of above indicated heavy metals for electroplating has caused pollution of soil and water. In order to supplement the exponential growth of population, more production of food grain is extremely inevitable (Singh and Singh, 1995). There is tremendous scarcity of potable water as a matter of fact farmers are force to use industrial waste water for their crop production.

All concentrations of chromium used were found inhibitory to seed ling growth. The extent of inhibition increases with increasing concentration of chromium (Chatopadhyay *et al.*, 1973). Concentration of Nickel chloride (1x10-3^{m}) was inhibitory to seed germination of *H. vulgare* cv. K-12 and the effluent containing chromium was reported inhibitory for seed germination.

As such it inspired us to search out impact of effluent of chromium plating industry on seed germination and growth of *Cicer arietinum* crop plants.

MATERIALS AND METHODS

For study the effect of chromium plating effluents on the physiology of germination and growth of leguminous crop plants. Uniformly elected seeds of *Cicer arietimum* cv. G-130 and H-208 were sterilized with 0.1% $HgCl_2$ solution and thoroughly washed with distilled water. The seeds were imbibed in different effluents collected from I, II of Cr plating industries for their specific imbibitions period along with control stets. There after sees were washed with water and transferred to distilled water moistened filter paper in petriplates for germination in dark.

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Seeds were allowed to germinate at room temperature in laboratory conditions. The seed with 2mm. length of radical were considered as germinated seeds.

Effluents from three sites of cr plating industry were used for the study of seed germination.

Site-I Factory effluents collected from discharge point.

Site-II Factory effluents collected from a distance of 50m. from discharge point.

Site-III Factory effluents collected from a distance of 100 m. from discharge point.

For seedling growth studies. Pre radicle emergence treatment seeds were pre treated with three sites (Site-I, Site-II and Site-III) of factory effluents solutions. Seedling growth study were done in terms of length and dry weight of seedling at 3rd, 5th and 7th day after radical emergence. Growth measurement were done on the 5th day.

RESULTS AND DISCUSSION

The maximum inhibition in seed germination was reported in Site-I treated seeds where as it was minimum in Site-III treated seeds in Site-II Chromium plating effluents used the inhibition in germination was in between the Site-I and Site-III treated sets. The inhibition was in Seed germination in Site-I, Site-II and Site-III Cr plating effluents was Ca 30%, 25% and 2% respectively in *Cicer arietinum* cv. G-130 and Ca. 28%, 18% and 2% respectively in *Cicer arietinum* cv. H-208 (Table 1, figure 1 & figure 2).

Table 1: Three Sites of Chromium Plating Effluents

Germination Percentage Inhibition				
Cultivars	**Control**	**Site-I**	**Site-II**	**Site-III**
Cicer arietinum cv. G-130	0%	30%	25%	2%
Cicer arietinum cv. H-208	1%	28%	18%	2%

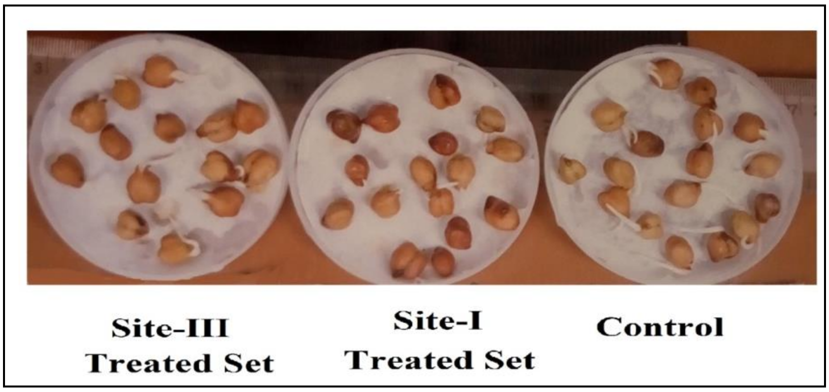

Figure 1: ***Cicer arietinum*** **cv. G-130**

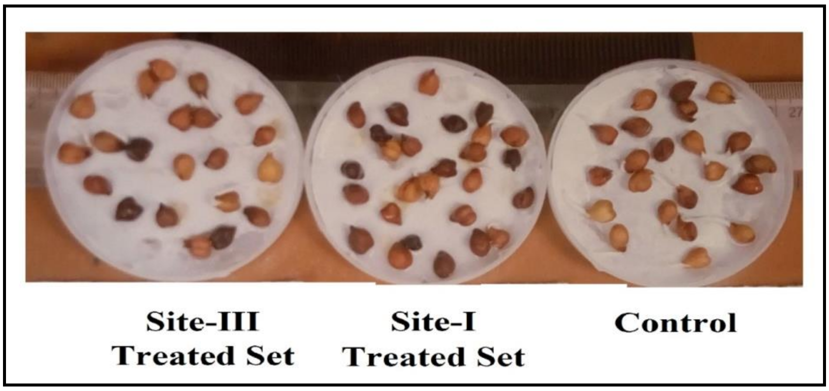

Figure 2: ***Cicer arietinum*** **cv. H-208**

Among two cultivars of *Cicer arietinum* cv. H-208 is more susceptible of chromium plating effluents toxicity than cv. G-130.

In this way differential responses are shown by above stated genotypes of *Cicer arietinum* to Cr plating effluent toxicity.

Effect of pretreatment of Cr plating effluents on seedling growth. At was of the interest to study the effect of three sites of Cr plating effluents on seedling growth. Seedling growth was studied in terms length measurements of seedling parts, this was done 5-days after radical emergence. Based on close response curves for different cultivars three sites and cultivars were chosen for seedling growth studies at 3rd, 5th and 7th day after emergence of radical at 5 days after radical emergence seedling were dissected into parts and their lengths were measured. The Site-III Cr plating effluents was ineffective for inhibition of seedling growth, however site- and site-m containing Cr plating effluents used were inhibition for seedling growth maximum inhibition in this regard was reported at the Site-I containing Cr plating effluents. (Table 2, Table 3)

Table 2: Effect of Chromium Plating Effluents Pretreatment to Seed on Seed Germination and Growth in Dark Grown Seedlings of *Cicer arietinum* cv. G-130

Parameter Organ				Germination	Length cm Radicle	Epicotyl	Fresh Weight mg Radicle	Epicoltyl
Days after Radicle Emergence	3	Sites of Chromium Plating Effluents	Control	90%	4.10	2.50	62.00	52.15
			Site-I	30%	2.00	1.00	32.00	29.10
			Site-II	70%	3.05	2.00	54.50	39.50
			Site-III	89%	5.00	3.00	70.50	54.10
	5		Control	-	5.90	4.00	92.10	111.50
			Site-I	-	3.25	2.00	55.50	180.20
			Site-II	-	8.00	3.10	65.10	120.10
			Site-III	-	9.00	4.00	98.50	111.50
	7		Control	-	10.00	4.00	98.50	111.50
			Site-I	-	6.10	3.75	115.10	135.40
			Site-II	-	10.00	5.50	135.50	155.90
			Site-III	-	12.50	8.10	169.10	225.40

Table 3: Effect of Chromium Plating Effluents Pretreatment to Seed on Seed Germination and Growth in Dark Grown Seedlings of *Cicer arietinum* cv. H-208

Parameter Organ				Germination	Length cm Radicle	Epicotyl	Fresh Weight mg Radicle	Epicoltyl
Days after Radicle Emergence	3	Sites of Chromium Plating Effluents	Control	95%	5.10	2.10	72.20	62.80
			Site-I	35%	2.00	1.00	50.10	52.10
			Site-II	70%	3.10	1.25	55.50	56.50
			Site-III	98%	5.50	2.00	74.10	63.50
	5		Control	-	9.40	5.00	142.10	63.50
			Site-I	-	4.00	2.10	100.10	122.10
			Site-II	-	6.00	3.10	110.50	135.10
			Site-III	-	9.50	5.00	145.00	145.50
	7		Control	-	13.15	9.30	256.00	303.00
			Site-I	-	9.10	4.10	192.50	185.00
			Site-II	-	10.00	6.00	112.10	201.50
			Site-III	-	14.10	10.00	223.50	308.00

Chromium plating effluents used from three sites were inhibitory for seed germination for all the cultivars of the test plants. Maximum inhibition was reported at Site-I treated seeds.

Pretreatment with three sites of chromium effluents are inhibitory for seed germination and seedling growth with maximum inhibition in the Site-I treated set and II treated set of above effluents show promontory effect for seed germination distinct genotype specific and organ specific differences also exist to investigate the impact of chromium effluents on the test plant one promontory and two inhibition effluent sites were selected.

CONCLUSION

Chromium plating effluents used from three sites were inhibitory for seed germination for all the cultivars of the test plants. Maximum inhibition was reported at Site-I treated seeds.

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