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EFFECT OF NICKEL PLATING INDUSTRY EFFLUENT ON SEED GERMINATION OF *Cicer arietinum* C.V. G-130 AND *Cicer arietinum* C.V. H-208

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ABSTRACT

Effect of different site of nickel plating industry effluent on germination of seed of *Cicer arietinum* C.V. G-130 and *Cicer arietinum* C.V. H-208 was studied. The maximum inhibition in seed germination was reported in site-1 treated seeds where as it was minimum in site-3 treated seeds. Among two cultivars of *Cicer arietinum* C.V. H-208 is more susceptible of nickel plating effluent than C.V. G-130.In this way differential responses are shown by above stated gen otype of *Cicer arietinum* to nickel plating effluent toxicity.

KEY WORDS: *Cicer arietinum*, site , genotype , industry effluent

Nickel (Ni) is a silvary metal forms about 0.008% of the earth crust. Nickel ranks 24^{th} among the elements in the order of abundance on the earth. Rapid progress in science and technology has been of great advantage to human but environmental pollution has become its by product. The improper management of atmosphere, hydrosphere and the lithosphere resulted in to 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 (Andrino, 1986) Some of the industrial effluents after certain dilution are found to be beneficial for irrigation purposes on the other side some trace elements like Arsenic, Cadmium, Mercury are in sugar industry effluent which proved to be injurious to plant health.(Leonard,1983)

Nickel widely used in electroplating to manufacture imitation, ornamental, 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. Concentration of nickel chloride (1×10^{-3}m) was inhabited to seed germination of *H.vulgare* cv. K- 12^5 (Leucas, 1974) and the effluent containing chromium was reported inhibitory for seed germination(Arumugam,1976) Nickel pollution on certain vegetable crop plants that nickel regarded the growth and yield of test plant, however when it was amended to soil in low percentage it was promotery.

MATERIALS AND METHODS

As such it inspired us to search out the impact of effluent of nickel plating industries on seed germination of *Cicer arietinum* C.V. G-130 and *Cicer arietinum* C.V. H – 208.

For study uniformly selected seed of the *Cicer arietinum* C.V. G-130 and H -208 were sterilized with 0.1% Hgcl2 solution and washed with distilled water. The seed were imbibed in different effluents collected form site-1 site -2 and site -3 of nickel plating industry for their specific imbibitions period along with control sets (seed imbibed in distilled water for their specific imbibitions period) There after seeds were washed with water and transferred to distilled water moistened filter paper in petriplates for germination in dark. Seeds were allowed to germinate at room temperature in laboratory conditions. The seeds with 2mm. length of radical were considered as germinated seeds. Selected plants for seed germination studies by cultivars. The imbibitions period for all the test plants was 20 hours. Nickel Platting factory has big chamber with several rods dipped in Ni solution. Plant is electrically operated. $NiSO_4.6H_2O$ is used for plating. Waste discharged form this industrial units can be source of water by soluble Nickel salts.

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

Site-1- factory effluents collected from discharged point.

Site-2- factory effluents collected from 50 m. away from

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discharged point. Site-3- factory effluents collected from 100 m. away from discharged point.

The maximum inhibition in seed germination was reported in site-1 treated seeds where as it was minimum in site-3 treated seeds. In site-2 nickel plating effluents used the inhibition in germination was in between the site-1 and site-3 treated sets . The inhibition was in seed germination in site-1, site-2, and site-3 nickel plating effluents was ca. 35% , 25% , and 2% respectively in *Cicer arietinum* C.V. G – 130 ca. 25% , 15% and 1% respectively in *Cicer arietinum* C.V. H -208 (Table-1)

RESULTS AND DISCUSSION

Among two cultivars of *Cicer arietinum* C.V. H – 208 is more susceptible of nickel plating effluent toxicity than C.V. G -130 . In this way differential responses are shown by above stated genotypes of *Cicer arietinum* to nickel plating effluent toxicity. For the study of effect of phasic pretreatment of nickel plating effluents on seed germination whole imbibition period was divided in to five equal phases (Regimes). Each phase in *Cicer arietinum* C.V. G – 130 and C.V. H – 208 was of four hours (having the imbibition period of 20 hours).Treatment were given to the seeds in these phase separately. While in the rest of the phases seeds were kept in distilled water. The nickel plating effluent used were site – 1, site – 2, and site -3. There is significant effect on seed germination in site – 3 treated seeds however site – 1 nickel plating effluents was inhibitory to the germination of seed in the above cultivars. The most interesting results recorded were that maximum inhibition in seed germination was in mid phase (Regime – 3) minimum in initial phase (Regime – 1). In rest of the phases inhibition in seed germination was in between the initial phase and mid phase. Thus inhibition is seed germination in regimes – 1, 2, 3 ,4, and 5 was ca.12, 15,20,14, and 13 respectively in *Cicer arietinum* C.V. G - 130, ca. 13, 16, 22, 15, and 13 respectively in *Cicer arietinum* C.V.H -208 (Table-2).

Nickel plating effluents used from three sites were inhibitory for seed germination for all the cultivars of the test plants. Maximum inhibition was reported in site – 1 treated seeds. In nickel containing effluents phasic pretreatment maximum inhibition in seed germination was in mid phase (Regime–3) minimum inhibition in seed germination in initial phase (Regime–1) in rest of the phases inhibition was in between the initial and mid phase.

TABLE 1

Three Sites of Nickel Plating effluents

Germination percentage inhibition

Cultivars		Control	Site -1	Site -2	Site -3
Cicer arietinum C.V. *G-130*		0%	35%	25%	2%
Cicer arietinum C.V. *H- 208*		0%	25%	15%	1%

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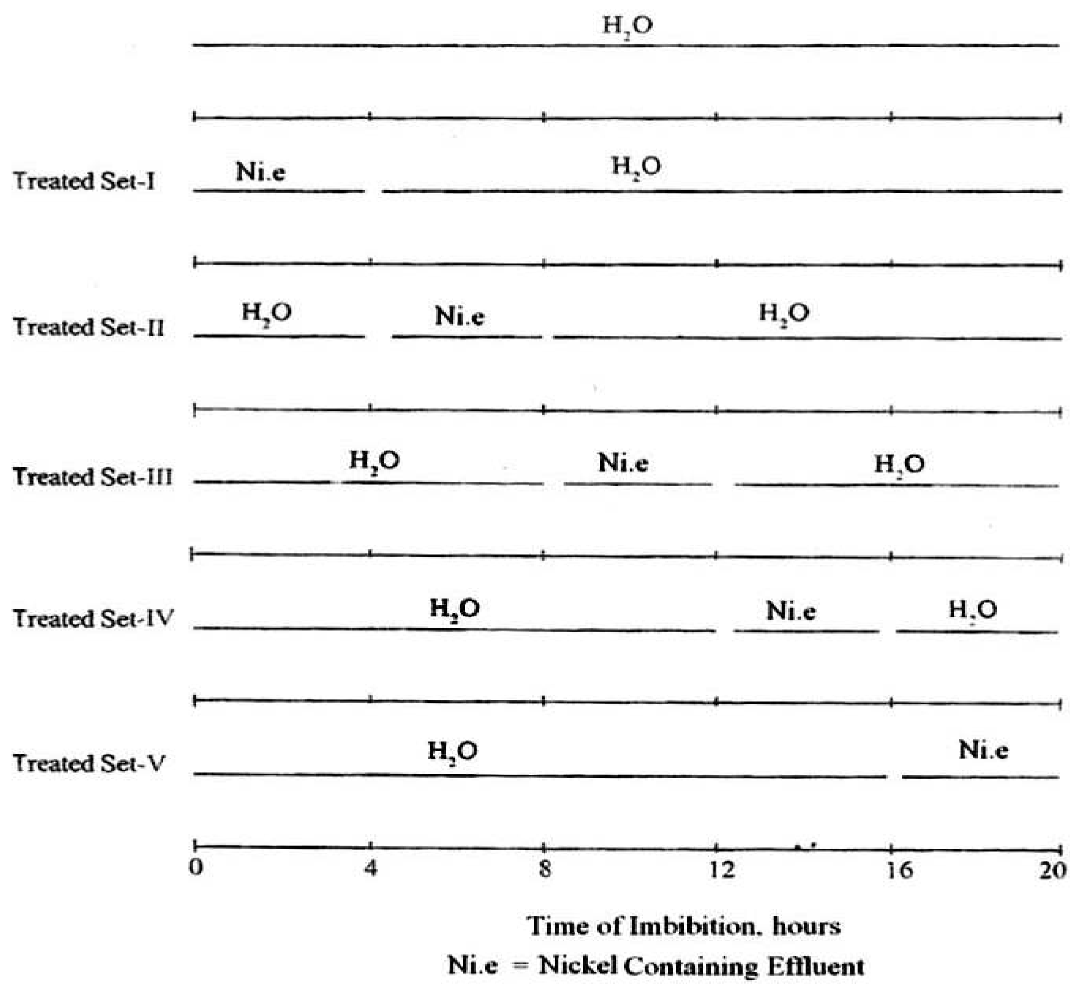
Table 2: Phasic Pretreatment Regimes of Nickel Plating Effluents



REFRENCES

Adriano D.C.; 1986. Trace elements in the terrestrial envioronment. Springer-Verlang, Inc NY.

Arumugam V.; 1976. Recover of chromiumform spent chrome liquor by chemical speciation. India J. Environ. Health, **18**:47.

Laughlin R.B. and Linden O.; 1985. Fate and effect of organotin compounds. Ambio., **14:**88.

Leonard A.;1983. Proc. Intern.Conf.on heavy metals in Environment. Neidelberg,; 700 – 705.

Leucas J.; 1974. Our Polluted Food. Wiley. NY.