I J R B A T, Issue (Special-15), Feb 2020: 136-140

A Double-Blind Peer Reviewed & Refereed Journal

e-ISSN 2347 – 517X

Original Article

INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY

PRELIMINARY STUDIES ON EFFECT OF NICKEL CHLORIDE ON CHLOROPHYLL CONTENT IN *CICER ARIETINUM* (L), *VIGNA UNGUICULATA(L)* WALP, *PISUM SATIVUM(L)*, *GLYCINE MAX (L.) MERR.*

Anuradha Vyavhare

New Art's, Commerce And Science College, Shevgaon, Dist-Ahmednagar, M.S. (India)

E-mail: anuradhavyavhare32@gmail.com

ABSTRACT:

Heavy metals are one of the important factors that have negative impact on man and environment, and their release to environment cause toxicity to plants that are continually exposed to potentially toxic heavy metals. Nickel is an essential nutrient for plants when it is in small quantity. Present investigation was executed with an objective to study the role of nickel chloride on chlorophyll content in *Cicer arietinum*(L), *Vigna unguiculata (L), Pisum sativum (L) and Glycine max (L.)* at different concentrations. The response of higher amount of NiCl to these parameters was found toxic as this concentration exceeds the micronutrient values of NiCl which are beyond permissible amount. Different NiCl levels remark by affected physiological growth of the plants. The toxicity of nickel affected the process of photosynthesis by damaging ultra- structure of chloroplast, less synthesis of chlorophyll.

Key words: - *Heavy metals, seed germination, chlorophyll, seedling.*

INTRODUCTION:

Heavy metals are one of the important factors that have negative impact on man and environment their release to environment cause toxicity to plants that are continually exposed to potentially toxic heavy metals. Some heavy metals such as aluminium, arsenic, cadmium, cobalt, chromium, copper, lead, manganese, mercury, nickel, selenium and zinc have been considered as the major environmental pollutants and their phytotoxicity has already been established (Ross, 1994; Kochian, 1995; Orcutt and Nilsen, 2000; Cseh, 2002; Fodor, 2002) Some of heavy metals are essential for plants and animals metabolism but their availability in medium varies and metals such as Cu, Zn, Fe, Mn, Mo, Ni and Co are essential micronutrients (Reeves R.D. and Baker A. J., 2000), whose uptake in excess amount to the plant requirements result in toxic effects (Monni S., et. al., 2000).

Nickel is an essential nutrient for plants when it is in small quantity. However, the amount of Ni required for normal growth of plants is very low amount. Hence, with the level of Ni pollution in the environment increasing with toxic effects of Ni in plants. According to Izosimova A (2005), Nickel concentration in polluted soil may range from 20 to 30-fold (200–26,000 mg/kg) higher than the overall range (10–1,000 mg/kg) found in natural soil. However, Nickel concentration is increasing in environment by human activities such as mining works, industries wastage and emission, burning of coal and oil, sewage, phosphate fertilizers and pesticides (Gimeno-Garcia E., et.al., 1996). Excess availability of Nickel in soil causes various physiological alterations and severe toxicity symptoms such as chlorosis and necrosis in different plant species including rice (Zornoza P., et.al., 1999, Rahman H., et. al., 2005, Das P., et. al., 1997). Plants grown in high concentration Nickel containing soil showed imbalance of nutrients and resulted in disorder of cell membrane functions. Thus, according to Ros R., et. al., (1992) Ni+2 affected the lipid composition and H-ATPase activity of the plasma membrane as reported in *Oryza sativa* shoots. Other symptoms observed in Nickel treated plants were related with changes in water and nutrient uptake balance. High uptake of Ni+2 induced a decline in water content of some dicot and monocot plant species. Therefore, decrease in water uptake is used as an indicator of the progression of Ni+2 toxicity in plants (Pandey N., et. al., 2002, Gajewska E., et. al., 2006). Sheoran I., (1990), showed that in pigeon pea (*Cajanus cajan*) nickel decreases chlorophyll content and stomatal conductance and also decrease enzyme activity which affect Calvin cycle and CO2 fixation. Due to nickel content Rye grass (*Lolium perenne*) reduced in plant nutrient acquisition; decrease in shoot yield and formation of chlorosis (Khalid B. and Tinsley J., 1980). In wheat (Triticum sp.) reduced in plant nutrient acquisition (T. Pandolfini T., et. al.,1992 V. S. Barsukova V., *et. al.*,1999). Lin Y. and Kao C., (2005), studied that in Rice (*Oryza sativa*) Inhibition of root growth due to this excess amount of nickel. Nickel chlorides pollution of soil and water ways occurs mainly as a result of effluent disposal from the mining smelting and electroplating industries and from sewage sludge compost. Nickel chloride has recently baeen has defined as an essential's micronutrients element required at very low concentration by plants.

Present investigation was executed with an objective to study the role of nickel chloride on chlorophyll content in *Cicer arietinum* (L), *Vigna unguiculata(L)* Walp, *Pisum sativum(L), Glycine max (L.) Merr.* at different concentrations.

MATERIAL AND METHODS:

The present study was conducted in order to find out the response of nickel on chlorophyll of Chickpea, cowpea, soybean and pea.

Plant Material: Green & senescent leaves of *Cicer arietinum* (L), *Vigna unguiculata(L)* Walp *Pisum sativum(L), Glycine max (L.) Merr.*

Seeds of four species chekpea, cowpea, soybean and pea were collected from fields. The seeds were washed firstly in running tap water followed by distilled water 3 times. Seeds were sterilized for 2 minute. in mercuric chloride solution to avoid contamination of any fungus disease and then wash in 70% alcohol again they were rinsed 3 times with distilled water. Ten sterilized seeds of each species were placed in solution of containing 0.1, 0.4, 0.7, 1.0% NiCl concentration beaker for 4 hrs. and for control seed were soaked in distilled water. Soaked seed were transfer in soil.

Chlorophyll (a and b & total) were estimated according to Arnon method.

RESULT AND DISCUSSION:

1.*Cicer arietinum* (L),

Table 1: Shown that amount of chl a was highest in con 1% of Nicl (18.33 gm /lit) it in followed by control, 0.7% ,0.4% while lowest in 0.1% (0.0067gm/lit).

Chl.b was hiesht in1%con of Nicl (18.75 gm/lit) it in followed by control 0.1% 0.4% while lowest in 0.7% (0.052gm/lit).

Total chl was hiesht in0.4% con of Nicl (22.93 gm/lit) it in followed by control 0.7% 0.1% while lowest in 0.1% (14.95gm/lit).

***2.Vigna ungniculta (L)* Walp**

Table 2: Shown that amount of chl a was highest in con 0.7% of Nicl (9.26 gm /lit) it in followed by control, 0.1% ,0.4% while lowest in 1% (0.012gm/lit).

Chl.b was hiesht in0.4%con of Nicl (7.41 gm/lit) it in followed by control, 0.1% 0.7 % 1% while lowest in 0.1% (0.0061gm/lit).

Total chl was hiesht in control con of Nicl (19.37 gm/lit) it in followed by 0.4 %,0.7% 1% while lowest in 0.1% (6.47gm/lit).

3.Pisum sativum (L)

Table 3: Shown that amount of chl a was highest in con control of Nicl (21.58 gm /lit) it in followed by control, 0.1% ,0.4% 1% while lowest in 0.7% (12.32gm/lit).

Chl.b was hiesht in control con of Nicl (15.52 gm/lit) it in followed by control, 0.4% 0.7 % 1% while lowest in 0.1% (10.87%gm/lit).

Total chl was hiesht in control con of Nicl (13.70 gm/lit) it in followed by 0.4 %,0.7% 1% while lowest in 0.1% (9.00gm/lit).

4.Glycine max (L.) Merr.

Table 4: Shown that amount of chl a was highest in con control of Nicl (23.87 gm /lit) it in followed by control, 0.1% ,0.4% 1% while lowest in 0.7% (6.56gm/lit).

Chl.b was hiesht in control con of Nicl (17.58 gm/lit) it in followed by control, 0.1% 0.4 % 1% while lowest in 0.7% (10.41%gm/lit).

Total chl was hiesht in 0.7% con of Nicl (68.99 gm/lit) it in followed by 0.1% 0.4 %, 1% while lowest in control (15.51gm/lit).

According to Abdel-Basset, *et. al.*, (1995), Sharma and Gaur (1995) and Ewais (1997), changes in the concentration of chl. a and chl. b and particularly changes in their total ratio are an equal important parameter which should always been taken under consideration when estimating the effect of an environmental parameters in plants. Ewais (1997) used *Cyperus difformis L.*, *Chenopodium ambrosiodes L.* and *Digitaria sanguinolis L.*, Sharma and Gaur (1995) used *Lemna polyrrhiza* (duckweed) and Abdel-Basset et. al., (1995) used two algae species (*Chlorella fusca* and *Kirchneriella lunaris*) to estimate the effect of heavy metals in total chlorophyll concentration. All three agreed that heavy metals accumulation responsible for the reduction of total chlorophyll concentration and had a similar negative effect in the ratio of chl. a and chl. b this occurs due to a faster hydrolysis ratio of chl. a compared with chl. b when plants are under any stress (Schoch and Brown, 1987; Drazkiewicz, 1994)

CONCLUSION:

It is concentration from the give experiment in that Ni at low level at as benifical micronutrients but at hight level it inceases toxicity. So it shown reduced chl ,a. chlb. & Total chl.at various concentration.

REFERANCE:

Atia Arzoo, sandeep Kumar Nayak Ashirbad Mohapatra Kunja Bihari Satapathy1* impact of nickel on germination seedlings growth and biochemical changes of Macrotyloma uniform (Lam) verdc Article Published on November 20,2014 International Journal of Bioscience |IJB| ISS:2220-6655 (print) 2222-5234 (online) vol.5 No 9,P.321-331,2014.

Ambika Asati, Mohnish Pichhode and Kumar Nikhil; Effect of Heavy Metal Plant; An Overview. International journal of Application or Innovation in Engineering and Management (IJAIEM) web site:www.ijaiem.org E mail :editor @ ijaiem org. Vol 5, Issue 3,March 2016.

Dimitrios BABALONAS, Styllianos KARATA GLIS and vasillions KABASSA-KALIS The Ecology of plant populations Growings on Supentine soils, Recived April 18, 1983 phyton (Australia) vol.24. Fasc. 2 225- 238 30.9.1984.

D.P. SINGH, B.B. SINGH and SANJEET GUPTA Devlopment of plant Urd 31: G high yeilding and yelloew mosaic Diseases resistance variety of black gram (Vigna mungo (L) Hepper) Revived: December 09,2014; Accepted March 31 ,2015). Journal of food Legumes 28 (1) :1-4 ,2015.

G.R .ROUT ,SAMANTARAY and P.DAS Chromium , Nickel and zinc Tolerance in Leucanea leucocephalla (k8) (Recived 6th january 1999) Silvae Genetica 48, 3-4 (1999)

Gyana Rajjan ROUT, Preamchanda DAS Effect of toxicity on plant growth and metabolishm: I.zinc plant Biotechnology Division .Reigional plant Resource.centre . Nayapali, Bhubaneular – 751015. India. Recived 2 March 2001; recived 21 December 2001; acepted 14 may 2002) Agronome 23 (2003) 3-11. (c) INRA, EDP Science, 2003 DOI:10,1051, agro; 2002073.

Gurpreet singh, Rajneesh K, Angnihotri, Rajendra Sharama Reshma and Mushtaa Ahamad, Effect of lead and nickel toxicity on chlorophyll and proline content of Urd (vigna Mungo L.) Seedlings International journal of plant physiology and Biochemistry Vol.4(6),136-141 October 12012.

Herman Clijsters,Ann Cuypers and Jaco Vangrounsveld* Physiological Response to Heavy metals in Higher plant; Defense against oxidative stress 2; Natur forces, 54c ,730 -734 (1999); recived November 22,1998 |April 10, 1999.

Mrigakhi Borah and Ashalata Devi, Effect of HEAVY METALS ON PISUM SATIVUM LINN I.J.A.B.R, VOL 2(2) 2012 :314 -321

Priti Sachan and Nand Lall* An overview of Nickel (Ni2+) Essentiallity, Toxicity and Tolerance stregies in plant Asian journal of Biology.2(4) : 1-15,2017; Article on ,AJOB, 33931 ISSN: 2456-7124.

Prabha sarivastava. Priliminary studies on effect of Nickel on chlorophyll content in Cicer aritinum. Department of Biology, Banaras .Hindu University , Veranasi 221005 (V.P) india A.D plant sci 27 (1) 193 – 194 ,2014.

Ratheesh Chandra, P,A bdussalam A.k, Nabeesa Salim and JOS T.PUTHUR Distribution of Bio- accumulated Cd and cr in two Vigna species and the Associated Histology Variation Journal of stress physiology & Biovhemistry Vol 6 No | 2010 pp 4-5 ISSN 1997 0838.

R.K Srivastava and N.P Melkania BIOACCUMULATION OF NICKEL IN PLANTS A REVIEV Dept of Environmental Science C;B.S.H G.B palnt university of Agri and Tech .Pantagar U.P Faculty of Ecosystem Management I.I F.M Bhopal M.P Vol .5(2) JUL.- Dec 88.

S. KAVERIAMMAL and A. SUBARMANI TOXIC EFFECT OF NICKEL CHLORIDE (NICL2) OF THE GROWTH BEHAVIOR AND BIOCHEMICAL CONSTITUUENTS OF GROUNDNUT SEEDLINGS. (Archis hypogeaea L.) International Journal of Resourch in botany 2013 ;3(4):48-52 Received 19 October 2013 ; accepted 28 October 2013

Table: Effect of Nicl on Chorophyll content of *Various palnt*

S. No	Conc. of NiCl (%)	Chl. a gm/lit.	Chl. b gm/lit.	Total Chl. gm/lit.
***Table :1 Cicer arietinum* L.**				
1	Control	0.0125	5.579	17.19
2	0.1	0.0067	0.0064	14.95
3	0.4	6.86	6.109	22.93
4	0.7	6.74	0.052	15.96
5	1	18.33	18.75	16.55
***Table 2: Vigna unguiculata* (L.) Walp**				
1	Control	0.0054	0.0084	19.37
2	0.1	0.0088	0.0061	6.47
3	0.4	0.0068	7.41	8.25
4	0.7	9.26	3.99	8.51
5	1	0.012	0.886	7.77
***Table 3: Pisum sativum* L.**				
1	Control	21.58	15.52	13.70
2	0.1	14.51	10.87	9.00
3	0.4	14.86	11.28	9.963
4	0.7	12.32	11.5	9.752
5	1	15.27	11.46	10.14
***Table 4: Glycine max* L. Merr.**				
1	Control	23.87	17.58	15.51
2	0.1	14.28	11.07	17.65
3	0.4	15.78	12.39	39.28
4	0.7	6.56	10.41	68.99
5	1	8.15	11.50	20.04